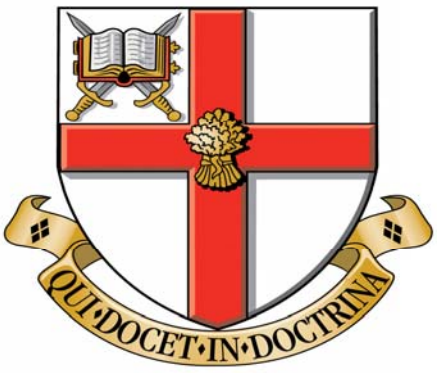

University of Chester

The social influences on the development of the self

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MSc Psychology (Conversion)

PS7112 Research Dissertation

2012/2013

University of Chester

Supervisor: Dr M. Yilmaz

Word count: 11,239

Declaration

This work is original and has not been submitted in relation to any other degree of qualification.

Signed……...

Print name……..…

Date……

Acknowledgments

I would like to thank the following people for the invaluable assistance they have given me throughout this project:

- Dr Mandy Yilmaz, my university supervisor, for her enthusiasm and encouragement throughout this project;
- My research assistants, Stephanie Wilshaw and Bethany Antonious, for their help during the study;
- My partner, Alan, who supported me throughout this research;
- I also extend special thanks to the parents and children who took part in this project, without whom the research would not have been possible.

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Abstract

Self-awareness is defined as one's ability to differentiate themselves from others, and is influenced by early life experiences (Fonagy, Gergely, & Jurist, 2003). Some children develop self-awareness earlier than others (e.g., Amsterdam, 1972; Lewis & Ramsey, 2004), however, the developmental field has largely neglected to consider how parents may influence the attainment of self-awareness. The present study aimed to explore how typical mother-child interactions might influence infant self-awareness and whether there was a link between object awareness and body self-awareness. In addition, it was predicted that there would be an association between infant mirror-recognition and body self-awareness as found in previous research (Moore, Mealiea, Garon, & Povinelli, 2007). Infants aged between 15-18 months (N=12) were recruited to test their body self-awareness and self-recognition by use of a toy shopping trolley task and mirror-recognition test respectively. The original hypothesis was not supported; there was no association found between infant mirror-recognition and body self-awareness. Additionally, the observed mother-child interactions did not influence infant self-awareness and there were no links found between object awareness and body self-awareness. The limitations of the study included the small sample size and the lack of longitudinal data. Implications for future research include a larger number of participants, together with collecting longitudinal and cross-cultural data to examine any cultural differences in infant self-awareness.

Keywords: infant, self-recognition, body self-awareness, mother-child interactions, culture.

The social influences on the development of the self

The development of the self is believed to be influenced by early life experiences; childhood interactions are opportunities for infants to gather and store information for future reference in relation to their interactions with different people (Fonagy, Gergely, & Jurist, 2003). Fonagy and colleagues suggest that this stored information enables children to adapt their behaviour depending on the person with whom they are conversing, thereby engendering an awareness of a separate self in relation to other people. Previous experiments have examined self-awareness in infants and found that the results differed depending on the age of the child (e.g., Amsterdam, 1972; Lewis & Ramsey, 2004). This might lead one to question why some children develop self-awareness earlier than others and it has been found that external factors, such as children's interactions with other people, may have some influence (Ross et al., in press). As such, the focus of the current study was to investigate the social factors which may impact upon the attainment of self-awareness in infants.

It is believed that self-awareness can be defined as one's ability to differentiate themselves from those around them (Rochat, 2003), however, Neisser (1988) dissects this further. He suggests that 'self-knowledge' can be split into several components: 1) the ecological self, relating to the perception of the self within the physical environment; 2) the interpersonal self, which is delineated by interactions with others within the same species; 3) the extended self, regarding one's memory and how this influences anticipation of future events; 4) the private self, highlighting the sole ownership of our conscious experiences; and 5) the conceptual self, the meaning of which derives from socially-influenced assumptions about human behaviour in general and ourselves specifically.

The concept of self-recognition was initially investigated by Gallup (1970), a comparative psychologist, in his work with chimpanzees. The studies involved anaesthetising the chimpanzees, surreptitiously applying a mark to their forehead and ear, isolating them in a cage for prolonged periods with a mirror, and observing their behaviour to see whether they were able to identify themselves via their reflection. Self-recognition would be indicated by the type of behaviours they displayed and whether or not they touched the applied marks. Gallup discovered that chimpanzees that were continually exposed to their reflections were able to recognise themselves in the mirror, and he subsequently theorised that this signified that the chimpanzees must have a self-concept (Gallup, 1975, 1982). These proposals were based on a review that he conducted of Cooley's (1912) work, who proffered that self-concept comprised of three elements: 1) how we think we appear to other people; 2) how we feel we are perceived by others; and 3) feelings such as pride which are linked to how one feels about themselves. Gallup (1970), together with other researchers (e.g., Anderson & Gallup, 2011; Hauser, Miller, Liu, & Gupta, 2001; Hyatt, 1998; Inoue-Nakamura, 1997; Roma et al., 2007), suggest that while great apes (e.g. chimpanzees, gorillas, orang-utans) have been seen to display a self-concept, monkeys (e.g. rhesus monkeys, tamarins) have not which might be due to a lower level of cognitive ability in monkeys. However, Swartz (1997) contested Gallup's views; she stated that his explanations of self-concept were inadequate and that the cognitive processes involved in self-recognition needed to be more clearly defined before assuming that these could be applied to chimpanzees.

Whilst Gallup's (1970) experiments focused on exploring whether primates possessed a self-concept, the field of developmental psychology concerned itself with human infants' developmental milestones such as the age at which they become self-aware (Bard, Todd, Bernier, Love, & Leavens, 2006). Amsterdam (1972), who was a child clinical psychologist, independently developed the same model as Gallup (1970) for assessing self-awareness in

human infants (Bard et al., 2006). He conducted similar such mirror-recognition studies, however, his participants were children between the ages of six and 24 months old. The experiments involved using rouge to mark the children's cheeks and then observing how they behaved in front of a mirror. He found that the infants' behaviour differed with age: between 6-12 months the infants viewed their reflection as a 'playmate', suggesting that the child was unable to identify the reflection as that of themselves; from 14-20 months the majority of infant subjects displayed embarrassment and exhibited avoidant behaviours towards the reflection, perhaps because levels of awareness had started to develop but they were still unsure of what the reflection represented; from 20-24 months almost two thirds of the infants had shown recognition of their reflections, although Bard et al. (2006) argue that only a relatively small percentage of children within this age group actually touched the mark which had been applied to their cheek. Amsterdam's (1972) study did not examine mother-child interactions and whether these had any impact on the children's behaviour in front of the mirror. Nevertheless, the findings suggest that infant self-awareness is something which develops over a period of time rather than occurring spontaneously, which has been found in other studies (e.g., Bertenthal & Fischer, 1978; Nielsen, Dissanayake, & Kashima, 2003). In clarifying this, Lewis and Ramsey's (2004) longitudinal study found that 11% of children aged 15 months old showed signs of self-recognition and that this percentage increased as the children got older: 18 months old (47%); 21 months old (82%); and 24 months old (100%). They also discovered that increased self-awareness was linked to the use of personal pronouns and pretend play, and suggested that children appear to develop a 'meta-representation' of themselves when they reach their second year. Other studies have also confirmed that infant self-recognition appears to take place mainly around the child's second year of life (e.g., Courage, Edison, & Howe, 2004; Lewis & Brooks-Gunn, 1979; Lewis & Ramsey, 2004).

Conversely, Fiamenghi (2007) contests the age at which infants achieve self-awareness and argues that levels of self-awareness could be present in children prior to them reaching one year of age. His experiment focused on observing children's interactions with a mirror and linking these to self-recognition, however, these interactions do not necessarily signify that the children were aware that it was *their* image with which they were interacting. Indeed, Loveland (1986) claims that a child's behaviour in front of a mirror may merely represent their process of learning about how a mirror functions. It could also be argued that exposure to mirrors simply enables children to identify their physical location in relation to the images reflected in the mirror; studies have confirmed that the ability of children to locate objects which are seen as a reflection in a mirror does not directly imply self-recognition (e.g., Butterworth, 1995; Mitchell, 1997; Robinson, Connell, McKenzie, & Day, 1990; Vyt, 2001). Nevertheless, studies have demonstrated that, as they grow older, infants can identify themselves more readily via the use of mirror-recognition tests (Nielsen, Suddendorf, & Slaughter, 2006), with the mirror-mark experiment being one of the most widely used in the field of infant self-awareness (Bard et al., 2006).

Whilst mirror-recognition tests help to confirm an infant's sense of self, there is also the awareness of the self as a physical object within the environment to consider (Moore, Mealiea, Garon, & Povinelli, 2007). Body self-awareness is also believed to develop gradually over the child's first few years of life (Brownell, Zerwas, & Ramani, 2007) and the concept was initially recorded by Piaget (1954) during observations of his own children. He witnessed his 18-month-old daughter struggling to pick up a rag on which she was standing; despite the resistance, she was unable to recognise that her body was obstructing her from picking up the rag and she gave up. Piaget discovered that after a month had passed his daughter was able to recognise the need to remove herself off of the rag in order to move it and subsequently inferred that, over time, children become more aware of themselves as

objects which exist and interact with other objects around them (Moore et al., 2007). Subsequent research replicated Piaget's studies using a mat and also found that infants did not pass the task until they were around 18 months old (e.g., Geppert & Kuster, 1983; Bullock & Lutkenhaus, 1990) . Other studies have explored the child's perception of their body *size* in relation to other objects, for example, children trying to fit themselves into doll's toys which are far too small for them (e.g., Brownell, Nichols, Svetlova, Zerwas, & Ramani, 2010; De Loache, Uttal, & Rosengren, 2004), and found that their perception also improved as they got older. Similar such studies have confirmed that most children are able to complete body recognition tasks between the ages of 18-24 months (e.g., Brownell et al., 2007; Rochat, 2001), which appears to tie in with the age at which infants achieve self-recognition in mirror-mark tests.

More recently, Moore et al. (2007) designed an experiment based on the reflections of Piaget (1954) and the work of Povinelli and Cant (1995). The experiment involved the use of a toy shopping trolley, attached to which was a small mat which was laid out on the floor behind the trolley; the mat could also be folded and placed underneath the trolley out of the way. In order to grasp the handle and push the trolley, the child would be required to step on the mat, however, this would make the moving of the trolley impossible. Infants would be deemed to have body self-awareness if they recognised that it was *their* weight on the mat that was impeding the movement of the trolley, stepped off of the mat and moved it aside in order that they could push the trolley successfully; this was deemed to be the 'self' condition. The experimenters also developed an 'object' condition whereby a tin of paint filled with sand was placed on the mat, the aim being that infants would recognise that the paint pot was the obstruction to successful movement of the trolley. Confirming the results of other studies (e.g., Geppert & Kuster, 1983; Brownell et al., 2007; Bullock & Lutkenhaus, 1990; Rochat, 2001), Moore et al. (2007) found that the older children were more successful in completing

the self and object conditions than the younger infants, however, they found no links between the children's abilities to identify an object (the paint pot) as an obstacle and their own body as an obstacle. One explanation of this might be because different cognitive abilities are used within the process of identifying objects and their relation to the environment, as opposed to the self and its place within the surrounding context (Moore et al., 2007). Similar findings regarding the lack of correlation between object awareness and body awareness are corroborated by Brownell et al. (2007).

The second part of Moore et al's. (2007) experiment examined potential links between body self-awareness and self-recognition, and they found there to be a positive correlation between the two. Indeed, in a previous study Dawson and McKissick (1984) discovered that children who failed the mirror self-recognition task also failed the object task, which appears to corroborate Moore et al's. (2007) findings. In exploring the gradual development of both self-recognition and body self-awareness, Rochat (2003) claimed there to be five levels of self-awareness: 1) infants can demonstrate a sense of their own body immediately after birth, for example, turning to the source of the stimulation when their cheek is touched (Rochat & Hespos, 1997); 2) by the second month of their life infants have a sense of where their body is situated in relation to other things around them; 3) at 18 months old they reach for the rouge mark in the mirror-recognition test in order to remove it; 4) by the age of three years infants develop a concept of their self as a constant, enduring entity in the world; and 5) once infants reach four to five years old they have developed representations of people and objects around them. As such, contrary to Moore et al.'s (2007) findings Rochat (2003) appears to suggest that body self-awareness and mirror recognition occur at different times during a child's development.

In relation to the potential influences on infant self-awareness, Harel, Eshel, Ganor, and Scher (2002) found that one element might be the birth order of the child, where first and third-born children were more likely to show mirror self-recognition earlier than second-born children; first-born children have been found to demonstrate greater cognitive ability and motor skills than their younger siblings (e.g., Solomons & Solomons, 1964; Zajonc, 1983), perhaps because they have had the benefit of exclusive attention from their mother which their younger siblings would not have had. Another factor cited by Harel et al. (2002) was the emotional availability between mother-child dyads (Emde, 1989). Harel and colleagues suggest that the child's knowledge of their self develops alongside their knowledge of others via interactions with their caregivers (e.g., Beebe, Lachmann, & Jaffe, 1997; Creighton, 2011; Stern, 1985; Volling, McElwain, Notaro, & Herrera, 2002), and they found that the more responsive infants were able to identify themselves more readily via the mirror-recognition test. Studies have found there to be gender differences relating to the emotional availability between mother-child dyads (e.g., Robinson, Little, & Biringen, 1993; Harel 1995; Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000), however, Harel et al. (2002) found no links between the child's gender and their attainment of self-awareness which is corroborated by other research (e.g., Lewis, Brooks-Gunn, & Jaskir, 1985; Schneider-Rosen & Cicchetti, 1991).

The quality of parenting has also been linked to the development of self-awareness (e.g., Bowlby, 1973; De Wolff & van IJzendoorn, 1997; Ferrier-Lynn & Skouteris, 2008; Winnicott, 1971). Indeed, the effects on child development were also the focus of a study by Schneider-Rosen and Cicchetti (1991) who found a link between self-recognition and how children were treated by their caregivers; those who experienced neglect were more likely to display neutral or negative responses to the mirror in self-recognition tests. Neglectful upbringing may influence the rate at which a child reaches their developmental milestones

which could therefore affect the age at which they develop self-awareness (Cicchetti & Carlson, 1989). Further evidence for developmental rates being linked to infant self-awareness has come from Mans, Cicchetti, and Sroufe (1978) who discovered that infants with Down's Syndrome were late in showing signs of self-awareness. In fact, whilst typically developing children tend to show signs of self-awareness at around 18 months of age, children with Down's Syndrome show similar signs once they have reached a *mental* age of 18 months (Lewis & Ramsey, 2004). However, another explanation for this developmental delay in infants with Down's Syndrome could be attributed to the communication styles of mothers with such infants. Research has found that mothers use more directive communication and supporting styles with infants with Down's Syndrome than those who have typically developing children (Roach, Barratt, Miller, & Leavitt, 1998). These parenting styles are observed more in collectivist cultures, which will be discussed later, and might explain the delay of such infants successfully completing the mirror-mark test.

Cultural variations are also believed to impact upon infant self-awareness (e.g., Forrester, 2001; Keller et al., 2004; Keller, Kärtner, Borke, Yovis, & Kleis, 2005; Markus & Kitayama, 1991). Tamis-LeMonda et al. (2008) discuss how Western cultures tend to be more 'individualist' in their approaches towards raising their children. This includes the promotion of the child's independence and their separateness from others, and may explain why children from Western cultures are more likely to explore the mark during the mirror-recognition test as they have been encouraged to view themselves as distinct from those around them (Ross et al., in press). In comparison, parents from non-Western, or 'collectivist', cultures (e.g. Asian, African) focus more on teaching the child about their role in relation to the surrounding family and wider community, more specifically, about the 'interdependence' of relationships (Tamis-LeMonda et al., 2008). This emphasis on the self as part of a wider group, as opposed to the Western view of the self as a distinct entity, may explain why children from such

cultures are less likely to pass the mirror-recognition test when compared to Western counterparts of a similar age as they have not been encouraged to think of themselves as separate from others (Ross et al., in press).

Further research into the differing cultural influences on infant self-awareness was found by Keller et al. (2005), who ascertained that a greater percentage of children from urban communities in Germany, Greece, and Costa Rica (50%) passed the mirror-recognition test than children from a rural community in Cameroon (4%). However, because these studies were only conducted with children aged between 18-20 months, Broesch et al. (2011) investigated whether testing older children from other non-Western cultures would elicit results which indicated developmental delay due to variations in parenting styles, and also whether the variations in mirror-recognition test results persisted past the age at which children usually reported passing the test. They used the mirror-recognition test to study children in Kenya, Fiji, Grenada, Saint Lucia, and Peru, and compared them with children from two Western communities in America and Canada. The Kenyan children ranged from 18 to 72 months of age, and the authors discovered that only two out of the 82 children displayed behaviours towards the mirror which would indicate self-awareness; the remainder froze whilst looking at their reflections in the mirror. Broesch et al. (2011) suggested that this freezing occurred across a wide age range within the Kenyan children and did not necessarily imply that they lacked self-awareness. In fact, subsequent to coding the data, Broesch et al. (2011) believed that the children *did* recognise themselves in the mirror but were unsure as to the response that was expected of them; this appears to corroborate research that has shown children from non-Western cultures to be less expressive than their Western counterparts (Keller et al., 2004).

When Broesch et al. (2011) conducted the mirror test with children from the remaining countries (Fiji, Grenada, Saint Lucia, Peru, America, and Canada) they found that 60% demonstrated behaviours pertaining to self-awareness, with America and Canada scoring highest which may indeed link to cultural differences. However, it should perhaps be noted that the children from these cultures were aged between 36-55 months old which was not a direct comparison to the Kenyan children, given that they were aged between 18-72 months of age. A higher percentage of infants passing the test in this second group would perhaps be expected given that the lowest age was above the 24 months at which children usually pass the mirror-recognition test. Nevertheless, the study found that children from Western (or individualist) cultures were still more likely to display self-recognition at a younger average age than children from non-Western (collectivist) cultures, so the above may be a moot point. These cultural differences have raised questions regarding the validity of the mirror-recognition test as a measure of infant self-awareness, especially where a child's exposure to mirrors has been rare if not unheard of (Broesch et al., 2011). However, research conducted by Priel and de Schonen (1986) found that infants from a nomadic tribe generally passed the mirror-recognition test by the time they were two years old, which would suggest that the mirror-recognition test *is* cross-culturally reliable.

In comparison with the cross-cultural studies relating to the mirror-recognition test (e.g., Broesch et al., 2011; Keller et al., 2005; Priel & de Schonen, 1986), there have been a lack of studies regarding cultural differences and their links with body self-awareness (Ross et al., in press). Because body self-awareness has been found to demonstrate the infant's awareness of their physical self and their interaction with the environment (Moore et al., 2007), it would therefore appear that this aspect of self-awareness might be more refined in children from collectivist cultures where importance is placed on emphasising the child's relatedness to their surroundings (Ross et al., in press). Indeed, Ross and colleagues conducted a cross-

cultural study to ascertain any links between individualist and collectivist parenting styles and the development of infant self-awareness. They found that the children from collectivist cultures performed better in the body self-awareness task than their Western counterparts, with the reverse being true for the mirror-recognition task; these findings are corroborated in other studies (e.g., Broesch et al., 2011; Keller et al., 2004, 2005). Their results suggest that environmental effects, which include culturally-specific parenting practices, have an impact on the development of infant self-awareness, although a study by Kärtner, Keller, Chaudhary, and Yovsi (2012) argues that this is not the case and that the development of self-awareness can be attributed to the maturational processes occurring within child development. [1]

Parenting styles are also believed to have an impact upon infant self-awareness (Fonagy, Gergely, & Target, 2007). Cross-cultural studies into parent-child interactions have observed how Western mothers position their faces closer to their children, providing mainly vocal and facial expressions. In comparison, mothers from Japan were more likely to include upper-body movements and touch with their facial and vocal expressions, emphasising the interconnectedness of the mother and child (Fogel, Toda, & Kawi, 1988). Studies have found that infants who have more face-to-face interactions with their caregivers are more likely to pass the mirror-recognition test (Keller et al., 2005); it is believed that caregivers who respond to their child's facial and vocal cues (e.g. by imitation, or 'mirroring') are effectively communicating to the child that their responses have come about due to the child's own cues (e.g., Fogel, 1993; Jaffe, Beebe, Feldstein, Crown, & Jasnow, 2001; Lavelli & Fogel, 2002). Through these interactions the child therefore learns that their actions have consequences on other people, thereby instilling a sense of a separate self from those around them; indeed,

[1] Although cultural influences on infant self-awareness were not the focus of the current study, the data gathered were also due to form part of another study into the cultural impact on infant self-awareness (Ross et al., in press). As such, a consideration of culture and its influence on self-awareness was deemed pertinent to the present study.

Asendorpf and Baudonnière (1993) suggest that self-and-other-awareness are positively correlated. Similarly, parent-infant interactions during object play have been discovered to differ cross-culturally. McCollum, Ree, and Chen (2000) interviewed Korean and white American mothers and found differing views of this activity. They discovered that Korean mothers believed that object play was an opportunity to show their child how to interact with the objects (e.g. using directive interventions), whilst white American mothers viewed their role within the same activity as that of being a mutual participant; sharing the activity, with the child playing an equal part in the experience.

In relation to the differing parenting styles within individualist and collectivist cultures, Singelis (1994) developed the Self-Construal Scale (SCS) in order to further clarify the ideas surrounding individualism and collectivism proposed by Markus and Kitayama (1991). This questionnaire aimed to measure people's levels of independent and interdependent self-construals, the development of which are believed to be influenced by one's culture (Triandis, 1989). Singelis proffered that these two self-construals are not complete opposites, but that they can co-exist within the same individual. As part of his study he recruited 364 students of varying cultural backgrounds to complete the scale and concurred that, whilst it was possible for cultural groups to be measured against a continuum of independence and interdependence, this was not the case for individuals and that these construals should be examined separately. As such, Singelis (1994) suggested that it was possible for someone from an individualist culture to also possess attributes deemed applicable to an interdependent self-construal and vice versa; indeed, Fernández, Paez, and González (2005) warn against the reduction of attributes for the sake of fitting them into cultural stereotypes. Conversely, other studies have questioned the reliability of the SCS (e.g., Kanagawa, Cross, & Markus, 2001; Kitayama, 2002; Levine et al., 2003; Markus & Kitayama, 1998; Miramontes, 2011). Miramontes (2011) found the scale to be more reliable when used within

Western cultures than in non-Western cultural groups, which is ironic given that the aim of the scale is to examine the comparisons across cultural groups. Additionally, Levine et al. (2003) found the scale to be cross-culturally 'unstable'; they questioned its ability to produce valid results when examining cultural elements and their links to specific outcomes. Another scale was introduced more recently, namely the Auckland Individualism and Collectivism Scale (AICS), which was developed by Shulruf, Hattie, and Dixon (2007). However, this scale contained 66 items compared to the 30 items within the SCS, making the SCS less onerous to complete and with a greater likelihood that participants would complete the whole questionnaire.

Research has also examined how language exchanges between parents and infants may impact upon their developing sense of self (Forrester, 2001). Ross et al. (in press) discovered low levels of physical contact, together with high levels of verbal interaction and direct references to the infant (e.g. by their name, or pet name) within the Western mother-child dyads. These references to the child would suggest the emphasis on the individualistic stance of Western cultures, with low levels of directive language and/or physical contact in order to encourage the child's autonomy. In comparison, the Zambian mothers in Ross et al.'s (in press) study demonstrated high levels of body contact together with directive physical and verbal contact. This directive physical contact infers that infants from such collectivist cultures are effectively deemed to be an extension of their mother's bodies (Keller et al., 2004, 2005), with directive language being utilised to gain compliance from the child and enhance their understanding regarding the links between themselves and their interactions with others and the environment (Ross et al., in press). These differing interactions underline the Western focus on individualism, as compared to the inter-relatedness deemed important within non-Western communities (Markus & Kitayama, 1991). More importantly, the culturally-specific interactions within Western and non-Western mother-child dyads were

found to positively correlate with the infants' successful completion of the mirror-recognition test and shopping trolley test respectively (Ross et al., in press).

This review of the literature has explored the gradual process of infant self-awareness and has examined the positive correlation between children's self-recognition and body self-awareness (Moore et al., 2007). It has also been found that infant self-awareness can vary due to different parenting styles (e.g., Fonagy et al., 2007; Jaffe et al., 2001; McCollum et al., 2000) and that the quality of parenting, and its influence on developmental rates, can also impact upon the age at which children attain self-awareness (Cicchetti & Carlson, 1989). The review has highlighted the need for further exploration into the parent-child dyad and its influence on the development of the self, together with a further examination of the possible links between self-recognition and body self-awareness. Given the results of other research examined within this literature review (Moore et al., 2007), it was hypothesised that in the present study there would be an association found between infant mirror-recognition and body self-awareness. In order to examine this, body self-awareness would be measured by using Moore et al.'s (2007) experimental methods, together with conducting a slightly altered version of the mirror-mark test. Additional aims of the present study were to explore how typical mother-child interactions might influence mirror-recognition and/or body self-awareness, and to assess whether there was a link between object awareness and body self-awareness.

There are a number of reasons why further exploration of the parent-child interaction and its possible influence on infant self-awareness is needed. The mirror self-recognition test is one which has been conducted numerous times to examine infant self-awareness (Bard et al., 2006), however, it offers a limited investigation in this area and only appears to measure a child's visual recognition of themselves (Moore et al., 2007). Moore and colleagues proffered that another way to examine the development of self is by testing the child's awareness of

their physical self and their interactions with the physical environment. Relatively little research has been conducted into body self-awareness and it was hoped that the present study would elicit more information in this area. Moreover, whilst other studies have explored the cultural elements which may influence infant self-awareness (e.g., Broesch et al., 2011; Rochat & Striano, 2002), there is a need for further exploration regarding the specific impact that typical mother-child interactions may have upon infant self-recognition and body self-awareness; the present study aimed to examine the influences of these mother-child interactions. In addition, it was intended that the findings within the present study would add to existing research regarding the cultural influences on infant self-recognition and body self-awareness (Ross et al., in press), and that the amalgamation of data might provide stronger evidence regarding the cultural factors which play a part in this aspect of child development.

Method

Prior to the recruitment of participants, the study was approved by the Department of Psychology Ethics Committee at the University of Chester (see Appendix A). In addition, participants were recruited in line with the ethical guidelines set out by the British Psychological Society.

Participants

Participants were required to be between 15-18 months old; this age range was selected due to it being the earliest age range in which self-recognition and body self-awareness have been demonstrated by infants (e.g., Courage et al., 2004; Lewis & Brooks-Gunn, 1979; Moore et al., 2007). Participants were also required to live in and around the areas of Staffordshire or Cheshire as these geographical areas were deemed a reasonable commuting distance for the researcher, if conducting the experiments in participants' homes, and the participants if they travelled to the University of Chester.

Advertisements were placed on 10 mother and baby internet forums, within 26 mother and toddler groups, and in 18 children's centres within Staffordshire and Cheshire. Forum administrators, group facilitators, and children's centre managers respectively were contacted in order to gain authorisation to display the recruitment poster (see Appendix B). The poster was also displayed at the University of Chester.

A total of 15 mother-child dyads from Staffordshire, Cheshire, and North Wales came forward to take part in the study, however, two mothers subsequently decided not to proceed and one child did not complete the experimental conditions meaning that their results could not be used. As such, a total of 12 mother-child dyads fully participated in the study with seven children being female and five being male. Eight of the mothers were first time mothers, with three being second time mothers, and one was a mother for the third time.

Seven of the mothers were employed, four were full-time mothers and one was a student, with all mothers being situated within middle-class families. All of the children had had varying degrees of exposure to mirrors, and nine out of the twelve children had not had prior experience with a toy shopping trolley. The age at which the children started walking ranged from nine to 15 months old (M = 12.21 months, SD = 1.70) and all were able to walk unassisted, which was a prerequisite for the self condition in the shopping trolley task.

Materials

The following materials were used within the present study:

- An information and consent form (see Appendix C);
- A demographic questionnaire containing 13 questions which aimed to capture information on each child, such as their prior experience of the toys used within the experiments (see Appendix D);
- A Self-Construal Scale questionnaire measuring levels of independence and interdependence (SCS, Singelis, 1994). This consisted of 30 questions on a 7-point Likert response scale ranging from 1 (strongly disagree) to 7 (strongly agree) (see Appendix E);
- A Panasonic digital video camera to film the experiments;
- A set of nine multi-coloured plastic stacking cups for the cup play session;
- A mirror (measuring approximately 59cm x 90cm) for the mirror play session;
- A toy shopping trolley (59.5cm high) with a plastic mat attached to the bottom-rear frame (74cm x 36cm) for the self condition (i.e. body self-awareness task), together

with an un-opened paint pot with a five litre capacity for the object condition (i.e. object awareness test) (see Figure 1);

- The same mirror as above, a clean tissue, and a small colourful children's sticker (approximately 2cm x 2cm) for the mirror-recognition test;
- A coding and transcription sheet for each dyad for the subsequent coding of each task (see Appendix F).

Figure 1. Toy shopping trolley, mat, and paint pot (taken from Moore et al., 2007)

Design

The experiments formed part of an observational study, with a mixed-methods design. The dependent variable was whether or not the children passed the self-awareness tasks (e.g. the shopping trolley self condition and the mirror-recognition test). There were four variables: 1) the mother-child interactions during the cup play, which comprised of four levels: a) positioning, b) body contact, c) actions, and d) eye gaze; 2) the mother-child interactions during the mirror play, which comprised of the same four levels; 3) the mother's speech during the cup play, which consisted of four levels: a) total discrete phrases, b) number of

directive phrases, c) number of affirmative phrases, and d) number of direct infant references; and 4) the mother's speech during the mirror play, which consisted of the same four levels.

Procedure

Upon contact with the researcher mothers were provided with the information and consent form, demographic questionnaire, and the SCS questionnaire (Singelis, 1994). The mothers were asked to read all of the documents prior to taking part in the study to ensure that they had informed consent before deciding whether or not they were happy for themselves and their child to participate. Upon meeting, the researcher gave the mothers hard copies of the consent form and questionnaires for completion. During this time, the video camera was brought out and made aware to the child as the researcher conversed with the mother. This was to ensure that the child felt at ease with the camera prior to beginning the experiments, however, no filming took place at this stage. Any queries raised from the questionnaires were clarified, although the researcher was careful to not give specific examples of answers to the mother.

Filming began from the start of stacking cup play session and filmed continuously throughout the experiment despite not all of the material being used. This was to ensure that the camera was not paid undue attention (e.g. by stopping and starting recording in between experiments) which may have distracted the child. There were, however, some instances where filming had to be stopped briefly and restarted either due to technical difficulties with the camera or due to the needs of the participants.

For the stacking cup play session, the mother was given the stacking cups and asked to play with them with her child. The researcher informed the mothers that there were no expectations of them in terms of how they played with their child and the cups during this part of the session. Between five and 10 minutes was allowed for this activity. After the

allotted time had passed, and provided that the mother and child were happy, the stacking cups were removed and the mirror was brought out for the mirror play session. The mother was asked to play with her child in front of the mirror for a few minutes, and was informed that there were no expectations on how she should play with her child in relation to the mirror. If both mother and child seemed happy, between five and 10 minutes was allowed for this activity.

After removing the mirror the shopping trolley was then given to the child in order to play freely with it for a few minutes, with no expectations placed on the mother as to how to play with her child and the shopping trolley. During this time the mother was instructed to prompt her child to push the trolley towards her from a distance of approximately six feet; this was to ensure that the child had no difficulty in pushing the trolley. This task was split into two conditions: the object condition and the self condition. For the object condition, the mat was unfolded behind the trolley and the paint pot was placed on top of the mat. The child was positioned behind the paint pot and the mat, ensuring that they held onto the handle of the trolley. After at least 10 seconds the mother was instructed to prompt their child to push the trolley towards them (e.g. “Push it to mum” or “Move the paint pot”). Once this condition had been tested, the researcher then moved onto the self condition whereby the paint pot was removed, the mat was unfolded, and the child placed on top of it ensuring that they held onto the handle of the trolley. After at least 10 seconds the mother was instructed to encourage her child to push the trolley towards them (e.g. “Push it to mum” or “Step off the mat”). For both the object and self conditions the child was allowed five attempts to complete the task, if they struggled. After five attempts the tests were terminated, although the tests were stopped sooner if the child showed signs of distress.

After the trolley test the child was encouraged to engage in a few minutes of free play. During this period the researcher instructed the mother to wipe the child’s nose using the

tissue; this was employed as a distraction whilst the sticker was placed onto the child's forehead. Filming continued here, with the researcher ensuring that the child was unaware of the physical presence of the sticker for one minute. After one minute the trolley and the toys were cleared and the mirror was brought out again. The child's mother was asked to remain quiet for at least 10 seconds in order that the child's spontaneous reaction to the sticker could be observed.

All mothers were debriefed once all of the experiments had been completed, and informed that the DVD of their session would be sent to them once the completed report had been submitted to the university.

Measures

For both the stacking cup and mirror play sessions, coding was carried out on the first 90 seconds of the session. A time-sampling method in line with Kellar et al.'s (2004) was utilised whereby coding was carried out in five second intervals; this allowed for a total of 18 intervals to be coded within each aspect of the mother-child interactions. The researcher coded for such aspects as: positioning (e.g. where the mother and child were positioned in relation to one another); body contact (e.g. what physical contact occurred between the mother and child); actions (e.g. whether or not the mother physically controlled the infant's actions); and eye gaze (e.g. whether the mother and child met each other's gaze). A verbatim transcription of the first 90 seconds of the mother's speech was also produced for both play sessions. From this transcription the total number of directive phrases (e.g. "pick up the cup", "look at the mirror"); affirmative phrases (e.g. "well done"); and phrases which referred to the child (e.g. you, he/she, infant's name) were identified and recorded.

The results for the shopping trolley object and self conditions were coded in relation to the criteria on the coding sheet. Infants were deemed to have passed the object condition if they:

a) interacted with the paint pot and/or showed signs of discomfort with it; or b) they moved the trolley whilst the paint pot was still on the mat. For the self condition infants were deemed to have passed if they: a) stepped off the mat and pushed the trolley spontaneously; or b) they stepped off the mat and pushed the trolley after prompting.

For the mirror-recognition condition the child's reactions to the sticker were coded in relation to the criteria on the coding sheet, with infants being deemed to have passed the task if they raised their arm to their face and touched within 3cm of the sticker (either spontaneously or after prompting).

Results

This section examines the findings of the stacking cup and mirror play sessions, together with the shopping trolley object and self conditions and mirror-recognition task.

The interactions which were coded for the cup play session were: position of the mother in relation to the child; body contact used by the mother; gestures displayed by the mother; eye gaze; and the mother's language. These are explored separately below.

Table 1 below sets out the means and standard deviations relating to the frequency of each position that was adopted by the mothers during the stacking cup exercise.

Table 1. Means and standard deviations for the frequencies of the mothers' positions during the cup play

Position of the mother	Mean no. of intervals	Standard Deviation
Faced the child	4.08	6.80
Sat diagonal to the child	10.58	8.12
Sat side by side	1.58	5.18
Sat behind the child	1.67	5.18

Whilst the mean indicates the average number of times that each position was adopted by the mothers, the standard deviations suggest that there were variations in the number of times that each mother used the different positions during the cup play exercise. These individual differences are best examined in the form of a graph which is shown in Figure 2 below.

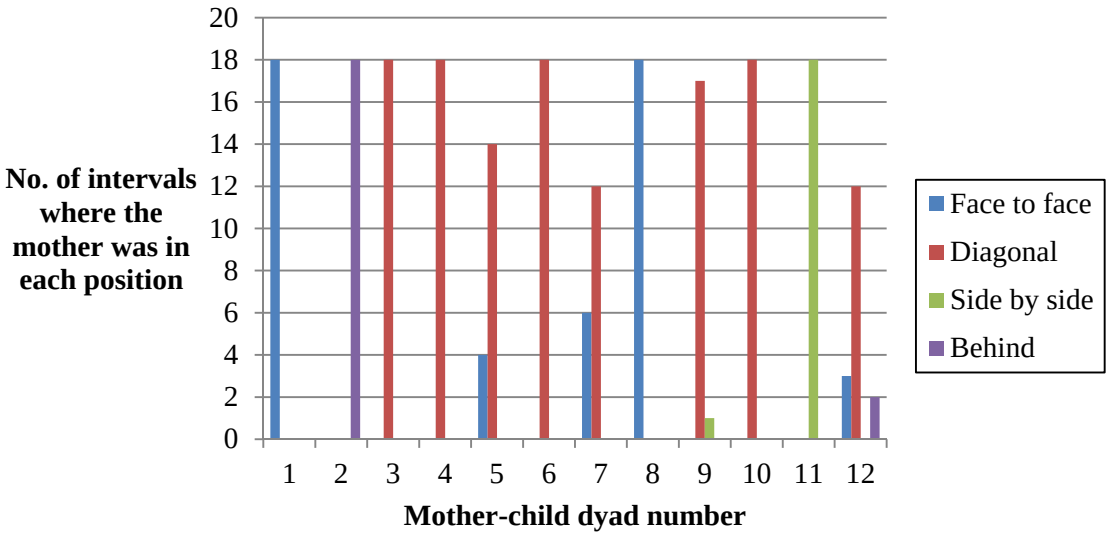

Figure 2. The frequencies of the mothers' positions during the stacking cup exercise

As seen from the figure two-thirds of the mothers positioned themselves diagonally to their child for the majority of the stacking cup exercise, two mothers were face to face with their child for the whole of the exercise, one mother was behind her child for the entire session and one mother was side by side with her child throughout the exercise. Some mothers changed their position during the cup play, however, most stayed within the same position for the duration of the play session.

Table 2 below shows the means and standard deviations relating to the number of times that each form of body contact was used by the mothers during the stacking cup exercise.

Table 2. Means and standard deviations for the frequencies of the mothers' body contact during the cup play

Position of the mother	Mean no. of intervals	Standard Deviation
Supportive position (mother touched or held the child)	1.08	3.15
Sitting position (child sat on mother's lap)	0.00	0.00
Close position (child sat on mother's lap and upper bodies touched)	0.58	2.02

From the table it can be seen that there was a low amount of body contact from the mothers during the stacking cup exercise and Figure 3 below displays the results more explicitly.

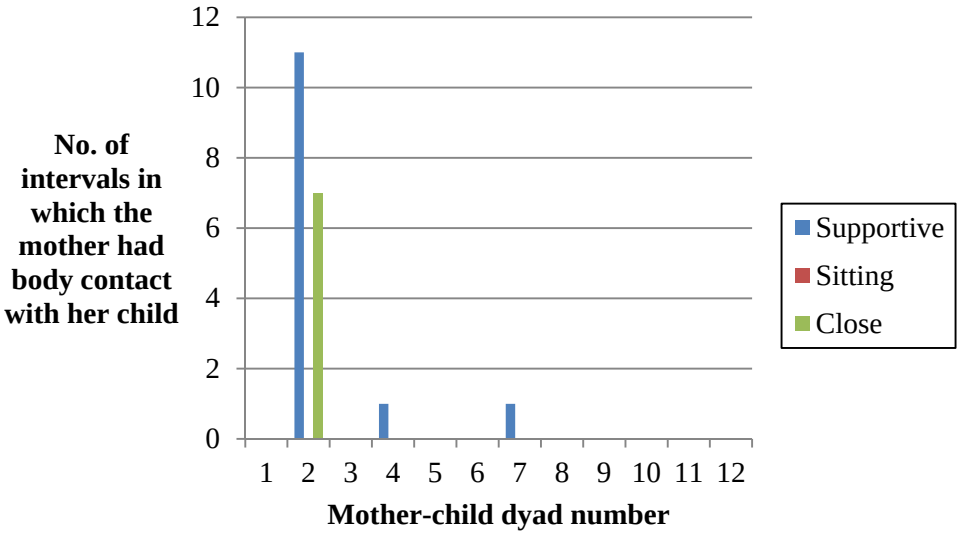

Figure 3. The frequencies of the mothers' body contact during the stacking cup exercise

The figure shows that one interval of the supportive position was observed in two mothers and that one mother adopted both the supportive and close positions with her child during the stacking cup exercise. No mothers employed a sitting position during the cup play.

Table 3 below shows the means and standard deviations relating to the number of times that each type of gesture was used by the mothers during the stacking cup exercise.

Table 3. Means and standard deviations for the frequencies of the mothers' gestures during the cup play

Gestures used by the mother	Mean no. of intervals	Standard Deviation
Direction (mother directly physically controlled the child's playing with the cup)	1.50	1.45
Suggestion (mother pointed to or held a cup towards the child)	4.25	2.49
Modelling (mother played with the cups without physically involving the child)	6.33	3.03
Affectionate (mother pat/tickled the child)	0.08	0.29

The above summary shows that a small number of directive and affectionate gestures were used by the mothers, with suggestion and modelling gestures being more frequently used. The standard deviations suggest variations in the frequency of these gestures used by the mothers and Figure 4 below graphically shows these variations.

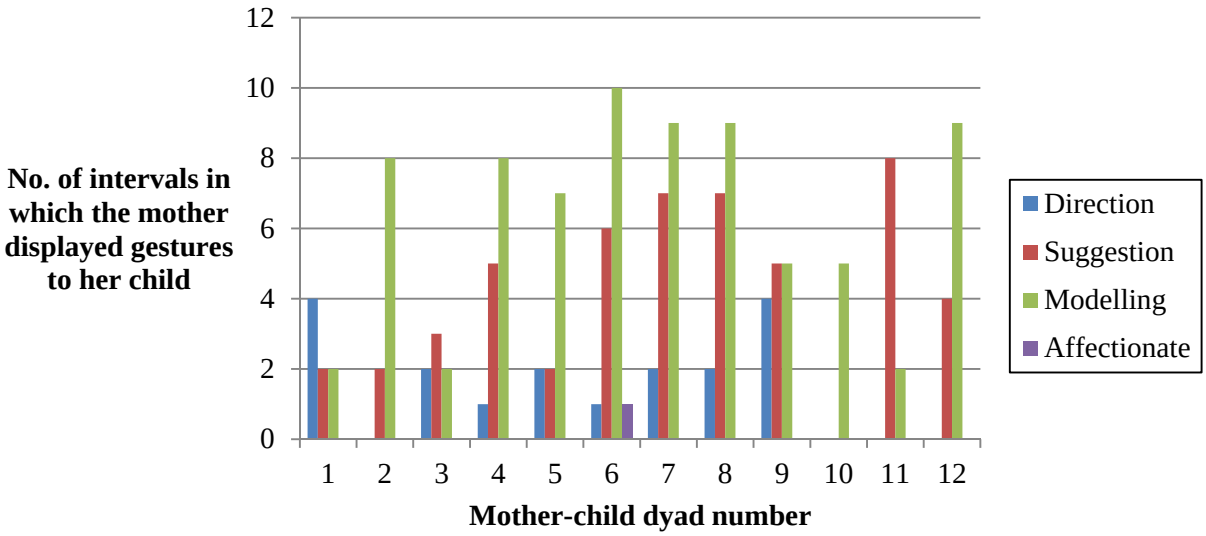

Figure 4. The frequencies of the mothers' gestures during the stacking cup exercise

The majority of mothers used modelling gestures during a large number of intervals, with suggestive gestures also being employed by most of the mothers but for a lesser number of intervals. Directive gestures were used by two-thirds of the mothers, however, the number of intervals in which these gestures were observed was lower than for the modelling and suggestive gestures. One mother displayed a small number of affectionate gestures with her child during the stacking cup exercise.

Table 4 below shows the means and standard deviations for the observed intervals of mother gaze, infant gaze, and mutual gaze.

Table 4. Means and standard deviations for the frequencies of eye gaze during the cup play

Eye gaze	Mean no. of intervals	Standard Deviation
Mother (mother looked at infant)	7.92	4.38
Infant (infant looked at mother)	0.00	0.00
Mutual (both looked at each other)	0.42	0.67

The table shows that the majority of gaze came from the mothers, with no infant looking at their mother unless the mother was also looking at them. Figure 5 below shows the more detailed results.

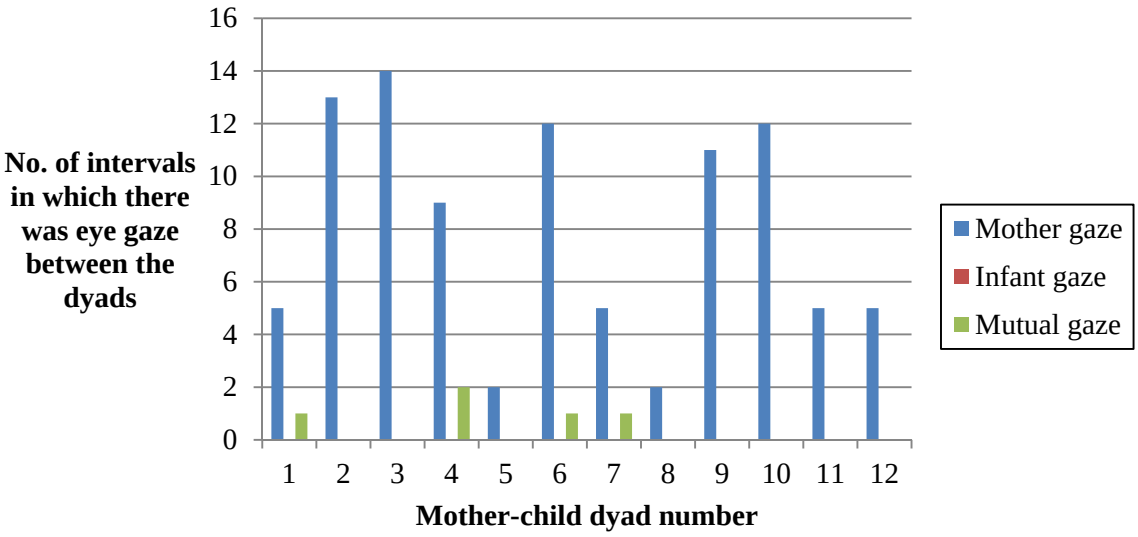

Figure 5. The frequencies of mother-child dyad eye gaze during the stacking cup exercise

All of the mothers looked at their children during the stacking cup exercise, but the number of intervals of mother gaze varied. Mutual eye gaze took place within four of the mother-child dyads for a small number of intervals.

As described in the method section a verbatim transcript of each mother's speech during the cup play session was also recorded. Table 5 below shows the means and standard deviations for the frequencies of each type of phrase used by the mothers.

Table 5. Means and standard deviations for the frequencies of the mothers' spoken phrases during the cup play

Phrase type	Mean no. of phrases used	Standard Deviation
Directive ("Do that", "Put this")	5.75	3.65
Affirmative ("Yay", "Wow")	1.42	1.98
Infant references ("You", "He", child's name)	8.33	5.28

The table shows that there were few affirmative phrases used, with directive phrases and infant references being higher. The standard deviations suggest that there were variations in the number of different phrases used by each mother and Figure 6 below shows these variations.

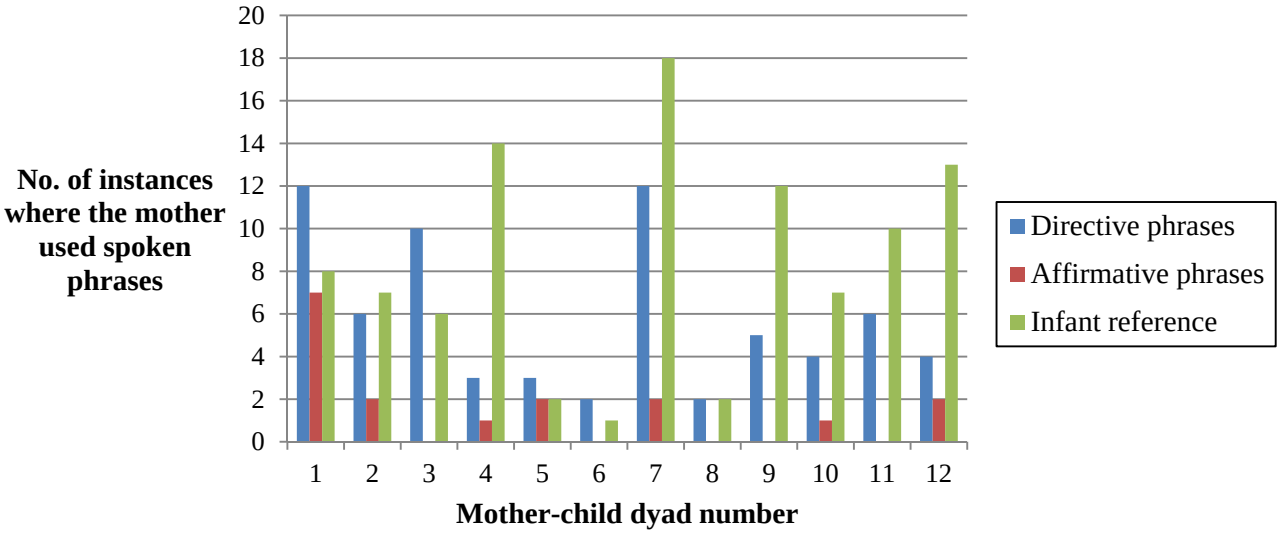

Figure 6. The frequencies of the mothers' spoken phrases during the stacking cup exercise

All of the mothers used directive phrases and made references to their children during the cup play, although the number of instances in which these phrases occurred varied. Seven out of the 12 mothers used a small number of affirmative phrases with their children.

For the mirror play, the mother-child interactions which were coded were the same as those for the cup play: position of the mother in relation to the child; body contact used by the mother; gestures displayed by the mother; eye gaze; and the mother's language. These are now examined separately.

Table 6 below sets out the means and standard deviations relating to the number of times that each position was adopted by the mothers during the mirror play exercise.

Table 6. Means and standard deviations for the frequencies of the mothers' positions during the mirror play

Position of the mother	Mean no. of intervals	Standard Deviation
Faced the child	1.00	1.86
Sat diagonal to the child	7.00	7.86
Sat side by side	0.08	0.29
Sat behind the child	9.50	7.53

As shown in the table the standard deviation related to each mean suggests that there were variations in the frequencies that the different positions were adopted during the mirror play exercise. Figure 7 displays the frequencies of the different positions and the variations in their use by the mothers.

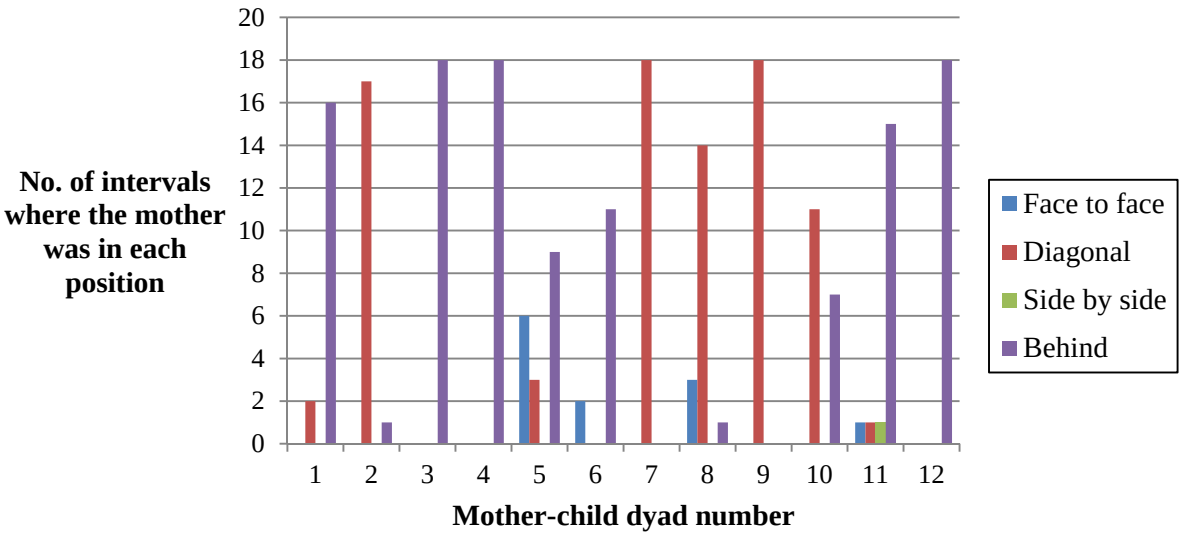

Figure 7. The frequencies of the mothers' positions during the mirror play exercise

As seen from the figure the majority of the mothers positioned themselves either diagonally or behind their child. Four mothers faced their child for a small number of intervals and one mother was side-by-side with her child for one interval during the mirror play.

Table 7 below shows the means and standard deviations relating to the number of times that each form of body contact was used by the mothers during the mirror play exercise.

Table 7. Means and standard deviations for the frequencies of the mothers' body contact during the mirror play

Position of the mother	Mean no. of intervals	Standard Deviation
Supportive position (mother touched or held the child)	4.33	4.58
Sitting position (child sat on mother's lap)	0.00	0.00
Close position (child sat on mother's lap and upper bodies touched)	0.25	0.87

The table shows the low level of body contact from the mothers during the mirror play exercise, with no mothers adopting a sitting position with their child. The variations in the number of intervals of body contact that were used are shown in Figure 8 below.

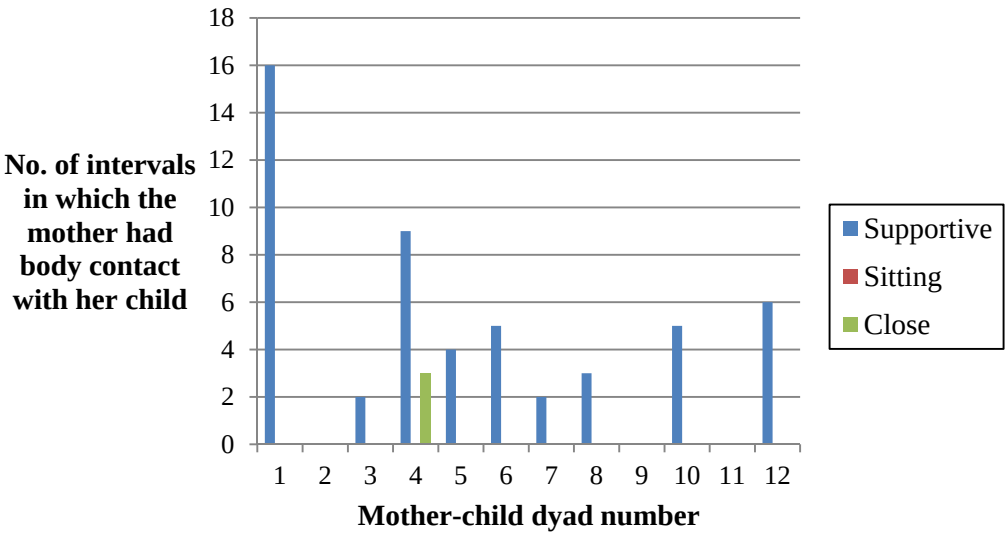

Figure 8. The frequencies of the mothers' body contact during the mirror play exercise

The majority of the mothers adopted a supportive position during the mirror play exercise, however, the number of intervals varied. One mother out of the 12 also used the close position with her child.

Table 8 below shows the means and standard deviations relating to the number of times that each type of gesture was used by the mothers during the mirror play exercise.

Table 8. Means and standard deviations for the frequencies of the mothers' gestures during the mirror play

Gestures used by the mother	Mean no. intervals	Standard Deviation
Direction (mother directly physically controlled the child's playing with the mirror)	2.42	3.75
Suggestion (mother pointed to or gestured towards the mirror)	2.58	1.88
Modelling (mother played with the mirror without physically involving the child)	1.75	1.71
Affectionate (mother pat/tickled the child)	0.92	1.24

The table suggests a lack of intervals in which the mothers used these gestures. Additionally, the standard deviations imply variations in the frequencies of these gestures and Figure 9 shows these variations more explicitly.

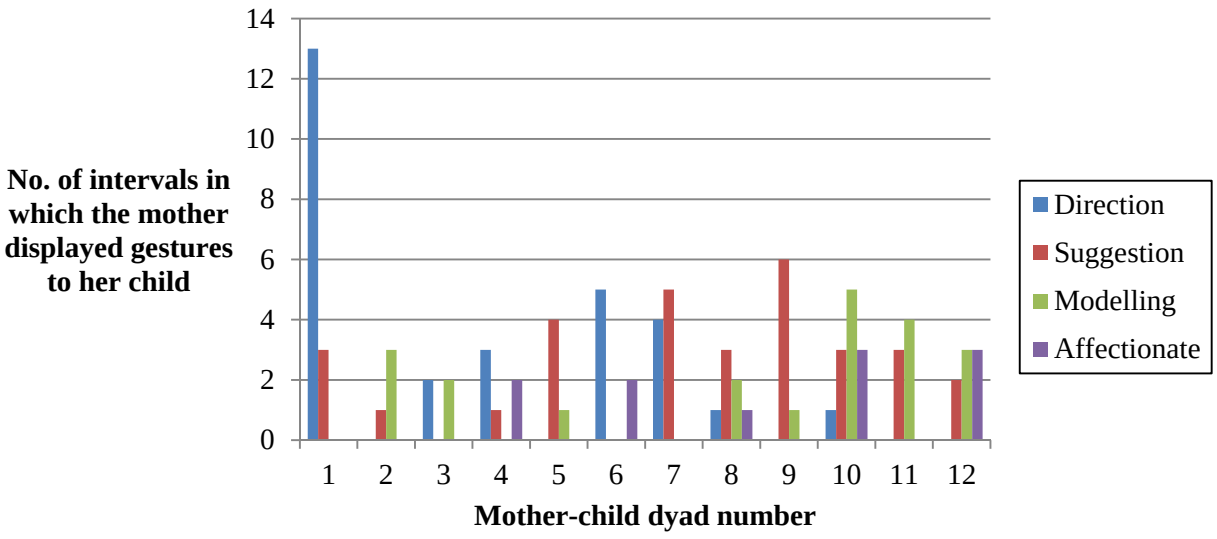

Figure 9. The frequencies of the mothers' gestures during the mirror play exercise

Most of the mothers used varying degrees of suggestion, direction, and modelling with their child during the mirror play session. Just under half of the mothers (five) used affectionate gestures during the mirror play.

Table 9 below shows the means and standard deviations for the observed intervals of mother gaze, infant gaze, and mutual gaze.

Table 9. Means and standard deviations for the frequencies of eye gaze during the mirror play

Eye gaze	Mean no. of intervals	Standard Deviation
Mother (mother looked at infant)	16.33	1.83
Infant (infant looked at mother)	0.00	0.00
Mutual (both looked at each other)	0.83	1.34

The majority of eye gaze came solely from the mothers, with a small number of intervals of mutual gaze, both of which can be seen more explicitly in Figure 10.

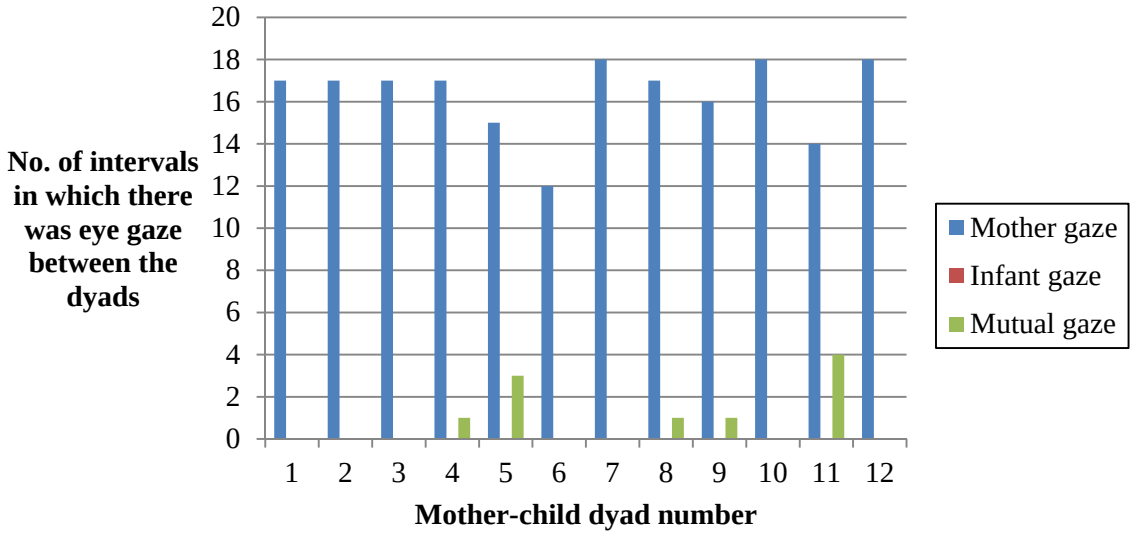

Figure 10. The frequencies of mother-child dyad eye gaze during the mirror play exercise

All of the mothers looked at their children for the majority of the 18 intervals during the mirror play exercise. Mutual gaze took place within five of the mother-child dyads and there were no instances where the infant alone looked at the mother.

As described in the method section verbatim transcripts of the mothers' speech during the mirror play were also recorded. Table 10 shows the means and standard deviations for the number of phrases used within each category.

Table 10. Means and standard deviations for the frequencies of the mothers' spoken phrases during the mirror play

Phrase type	**Mean no. of phrases used**	**Standard Deviation**
Directive ("Look at the mirror")	5.00	3.59
Affirmative ("Yay", "Wow")	0.25	0.87
Infant references ("You", "He", child's name)	12.83	7.79

The table suggests that a low number of directive and affirmative phrases were used, with infant references being higher. The standard deviations suggest that there were variations in the number of different phrases used by each mother and these can be seen in more detail in Figure 11.

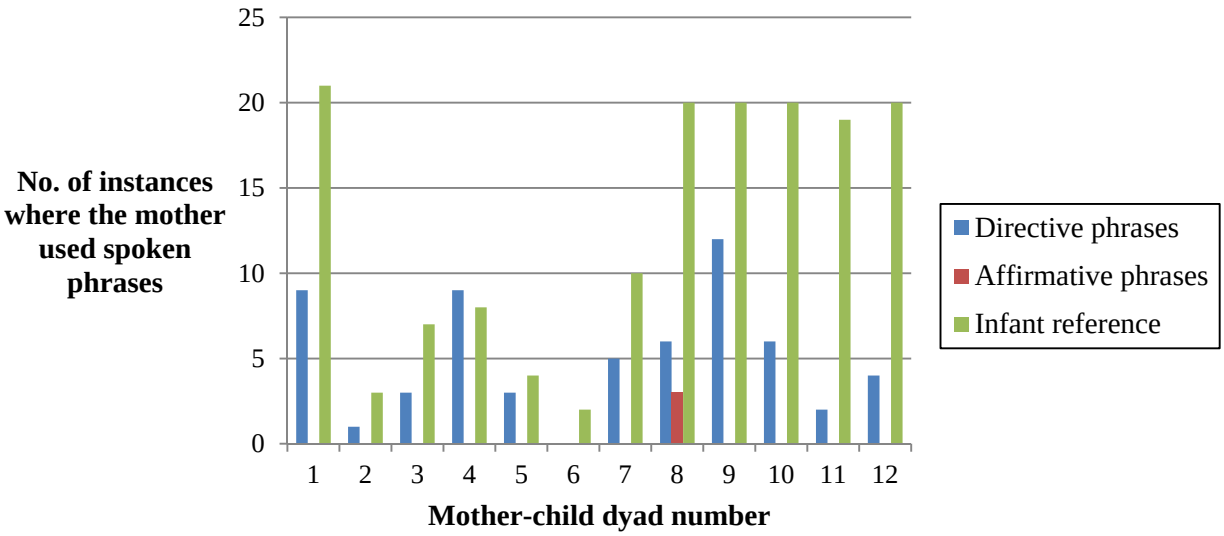

Figure 11. The frequencies of the mothers' spoken phrases during the mirror play exercise

The majority of mothers used varying amounts of directive phrases and infant references with their child. One mother used affirmative phrases during three discrete instances.

The results for the shopping trolley object and self conditions, and the mirror-recognition task are now examined. Table 11 below summarises the results of the experimental conditions used to assess infant self-awareness.

Table 11. Summary of the results of the shopping trolley object and self conditions, and the mirror-recognition task

Dyad number	Infant age (months)	Infant gender	Object condition	Self condition	Mirror condition
1	15	Male	**Passed**	**Passed**	Not passed
2	15	Female	Not passed	Not passed	**Passed**
3	15	Male	Not passed	Not passed	Not passed
4	16	Female	**Passed**	Not passed	**Passed**
5	18	Female	**Passed**	**Passed**	Not passed
6	16	Female	**Passed**	**Passed**	Not passed
7	17	Female	Not passed	**Passed**	Not passed
8	17	Male	**Passed**	**Passed**	Not passed
9	15	Male	**Passed**	**Passed**	Not passed
10	18	Male	**Passed**	**Passed**	**Passed**
11	16	Female	Not passed	**Passed**	Not passed
12	17	Female	Not passed	**Passed**	Not passed

From the table it can be seen that one child did not pass any of the experimental conditions, one child passed all three of the experimental conditions, five children passed the shopping trolley object and self conditions, three children passed the self condition only, one child passed the object condition and mirror-recognition task, and one child passed the mirror-recognition task only. Figure 12 below graphically shows how many children passed each experimental condition.

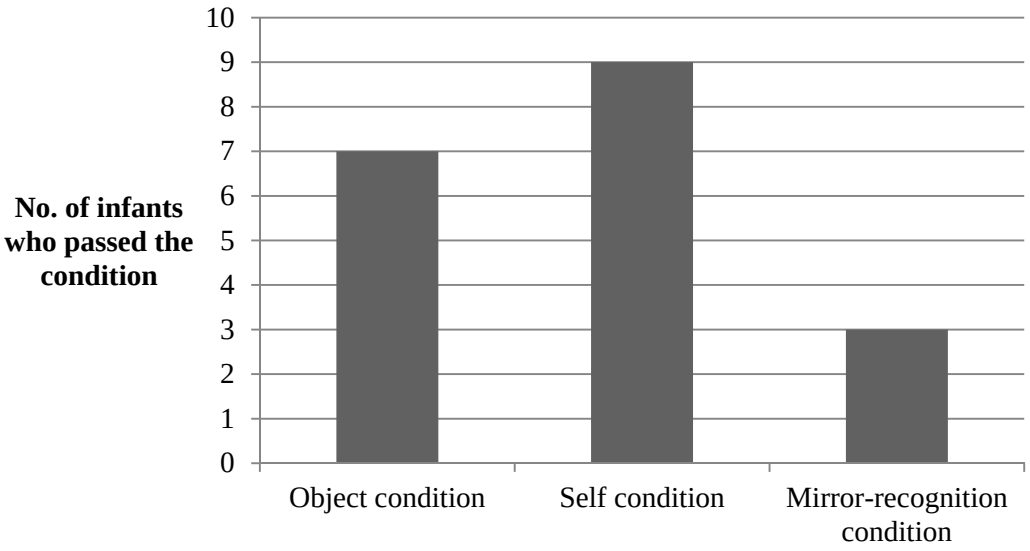

Figure 12. The number of infants who passed each experimental condition

The first analysis focused on whether there were any links between the frequencies of each type of mother-child interaction and the infants who passed or did not pass the experimental conditions. Prior to this, however, paired-samples *t*-tests with the alpha level set at $p<0.05$ were conducted via SPSS v.20 to assess whether there were any significant differences between the cup and mirror play sessions in relation to the number of intervals in which each interaction was observed. Infant gaze was not included in the analysis as no intervals were observed in either play session. Due to the number of paired-samples *t*-tests which were carried out the results are given in Table 12 below.

Table 12. Paired-samples *t*-tests comparing the differences in the frequencies of each type of interaction in the cup and mirror play

Interval type	Type of play	Mean	Standard Deviation	*t*	df	Sig. (2-tailed)
Face-to-face position	Cup play	4.08	6.80	1.60	11	.137
	Mirror play	1.00	1.86			
Diagonal position	Cup play	10.58	8.12	1.01	11	.334
	Mirror play	7.00	7.86			
Side by side position	Cup play	1.58	5.18	1.06	11	.311
	Mirror play	0.08	0.29			
Behind position	Cup play	1.67	5.18	-2.61	11	.024
	Mirror play	9.50	7.53			
Total body contact	Cup play	1.67	5.16	-1.25	11	.236
	Mirror play	4.58	4.93			
Total directive gestures used	Cup play	1.50	1.45	-0.97	11	.351
	Mirror play	2.42	3.75			
Total suggestive gestures used	Cup play	4.25	2.49	1.99	11	.072
	Mirror play	2.58	1.88			
Total modelling gestures used	Cup play	6.33	3.03	4.13	11	.002
	Mirror play	1.75	1.71			
Total affectionate gestures used	Cup play	0.08	0.29	-2.42	11	.034
	Mirror play	0.92	1.24			
Mother looked at their child	Cup play	7.92	4.38	-6.03	11	.000
	Mirror play	16.33	1.83			
Mother and child look at one another	Cup play	0.42	0.67	-0.89	11	.392
	Mirror play	0.83	1.34			
Mother used directive phrases	Cup play	5.75	3.65	0.55	11	.597
	Mirror play	5.00	3.59			
Mother used affirmative phrases	Cup play	1.42	1.98	1.74	11	.111
	Mirror play	0.25	0.87			
Mother used infant references	Cup play	8.33	5.28	-1.90	11	.083
	Mirror play	12.83	7.79			

The table shows that the differences between the number of intervals observed for each interaction during the cup and mirror play were significant in relation to only four out of the 14 interactions. The difference in the intervals that mothers spent behind the child during the cup and mirror play was deemed to be significant, as were the differences in modelling gestures, affectionate gestures, and mother gaze; these differences will be explored further in the discussion section. Due to the overall lack of significant differences between the interactions in the cup and mirror play sessions, it was not deemed necessary to examine the interactions of each play session separately in relation to their influence on infant self-awareness. Instead, the frequencies for each corresponding interaction within the cup and mirror play sessions were added together and averages calculated. The average number of intervals for each interaction was then examined in relation to the infants who passed or did not pass the shopping trolley self condition (i.e. body self-awareness) and mirror-recognition task (i.e. self-awareness). Infant gaze was not included in the analysis as no intervals were observed in either of the play sessions. Independent *t*-tests with the alpha level set at $p<0.05$ were conducted and the results are set out in Table 13 (body self-awareness task) and Table 14 (mirror-recognition task) below.

Table 13. Independent *t*-tests examining the frequencies of the different types of mother-child interactions according to whether infants passed or did not pass the body self-awareness task

Cup + mirror play average intervals	Pass/Not pass	Mean	SD	*t*	df	Sig. (2-tailed)
Face to face position	Pass	4.25	4.67	-1.74	5.67	.136
	Not pass	0.83	1.21			
Diagonal position	Pass	9.58	5.81	-0.52	10	.616
	Not pass	8.00	4.72			
Side by side position	Pass	0.08	0.20	0.95	5.03	.387
	Not pass	1.58	3.88			
Behind position	Pass	3.67	3.04	1.94	10	0.81
	Not pass	7.50	3.77			
Body contact	Pass	5.50	5.47	0.21	10	.841
	Not pass	6.17	5.72			
Directive gestures used	Pass	2.75	2.95	-1.20	10	.258
	Not pass	1.17	1.33			
Suggestive gestures used	Pass	3.42	1.53	0.00	10	1.00
	Not pass	3.42	1.93			
Modelling gestures used	Pass	3.92	1.69	0.27	10	.792
	Not pass	4.17	1.51			
Affectionate gestures used	Pass	0.58	0.74	-0.41	10	.689
	Not pass	0.42	0.66			
Mother looked at their child	Pass	8.08	0.97	1.06	10	.313
	Not pass	8.67	0.93			
Mother and child looked at one another	Pass	0.58	0.49	0.20	10	.843
	Not pass	0.67	0.88			
Mother used directive phrases	Pass	5.33	3.54	0.05	10	.961
	Not pass	5.42	1.93			
Mother used affirmative phrases	Pass	1.08	1.32	-0.87	10	.405
	Not pass	0.58	0.49			
Mother used infant references	Pass	9.92	6.18	0.42	10	.681
	Not pass	11.25	4.63			

Table 14. Independent *t*-tests examining the frequencies of the different types of mother-child interactions according to whether infants passed or did not pass the mirror-recognition task

Cup + mirror play average intervals	Pass/Not pass	Mean	SD	*t*	df	Sig. (2-tailed)
Face to face position	Pass	0.00	0.00	2.57	8	.033
	Not pass	3.39	3.96			
Diagonal position	Pass	10.67	3.33	-0.72	10	.490
	Not pass	8.17	5.61			
Side by side position	Pass	0.00	0.00	0.59	10	.567
	Not pass	1.11	3.15			
Behind position	Pass	7.33	3.33	-0.91	10	.386
	Not pass	5.00	3.98			
Body contact	Pass	10.33	4.86	-1.86	10	.092
	Not pass	4.33	4.82			
Directive gestures used	Pass	0.83	1.04	0.96	10	.359
	Not pass	2.33	2.56			
Suggestive gestures used	Pass	2.00	0.87	2.57	6.98	.037
	Not pass	3.89	1.62			
Modelling gestures used	Pass	4.83	0.76	-1.04	10	.323
	Not pass	3.78	1.66			
Affectionate gestures used	Pass	0.83	0.76	-0.99	10	.347
	Not pass	0.39	0.65			
Mother looked at their child	Pass	9.00	0.50	-1.36	10	.205
	Not pass	8.17	1.00			
Mother and child looked at one another	Pass	0.50	0.87	0.35	10	.731
	Not pass	0.67	0.66			
Mother used directive phrases	Pass	4.83	1.26	0.38	10	.710
	Not pass	5.56	3.11			
Mother used affirmative phrases	Pass	0.67	0.29	0.32	10	.752
	Not pass	0.89	1.14			
Mother used infant references	Pass	9.83	4.37	0.27	10	.790
	Not pass	10.83	5.73			

Table 13 shows no significant differences between the frequencies of the mother-child interactions in relation to the infants who passed or did not pass the body self-awareness task. Upon checking whether the assumption of homogeneity of variance had been met, Levene's Equality of Variances test proved significant for the average frequencies of face-to-face and side-by-side positions adopted by the mothers. As such, the assumption of normality had been violated and equal variances could not be assumed for these two test results, so the values were corrected accordingly. Table 14 shows two significant differences between the frequencies of the mother-child interactions within the pass and not pass groups; these relate to the average number of intervals in which mothers positioned themselves face-to-face with the child and the average number of suggestive gestures that were used. Levene's Equality of Variances test was conducted and proved significant for these same two results, meaning that the assumption of homogeneity of variance had been violated. As such, the test values were corrected accordingly. Both of these results suggest that greater frequencies of face-to-face contact and suggestive gestures increased the proportion of infants who did not pass the mirror-recognition task.

A chi square analysis was then conducted to examine any association between infants who passed the shopping trolley self condition and those who passed the mirror-recognition test. Table 15 below is the contingency table for the expected and observed counts of infants who passed or did not pass the self condition and mirror-recognition task.

Table 15. Contingency table for the infants who passed or did not pass the self-condition and mirror-recognition task

		Mirror-recognition task		
Self condition		Pass	Not pass	Total
Pass	**Observed count**	**1**	**5**	**6**
	Expected count	1.5	4.5	6
Not pass	**Observed count**	**2**	**4**	**6**
	Expected count	1.5	4.5	6
Total		**3**	**9**	**12**

The data did not meet the assumptions of the chi square test in terms of the expected count of cells. A two-tailed Fisher's exact test was deemed to be non-significant, $p = 1.00$, meaning that there appeared to be no association between body self-awareness and mirror-recognition.

In addition, the association between infants who passed the shopping trolley self condition and the object condition was examined. Table 16 below is the contingency table for the expected and observed counts of infants who passed or did not pass the self condition and object condition.

Table 16. Contingency table for the infants who passed or did not pass the self condition and object condition

		Object condition		
Self condition		Pass	Not pass	Total
Pass	**Observed count**	**6**	**0**	**6**
	Expected count	5	1	6
Not pass	**Observed count**	**4**	**2**	**6**
	Expected count	5	1	6
Total		**10**	**2**	**12**

Again, the data did not meet the assumptions of the chi square test in terms of the expected count of cells. A two-tailed Fisher's exact test revealed the results to be non-significant, $p = .455$, meaning that there appeared to be no association between body self-awareness and object awareness.

In relation to the Self-Construal Scale (SCS, Singelis, 1994), all 12 mothers completed the questionnaire. The mean independent and interdependent scores are shown below in Table 17, with the standard deviations indicating that the scores within each measure varied between the mothers.

Table 17. Means and standard deviations for the SCS questionnaire scores

Measure	Mean score (out of 7)	Standard Deviation
Independent	4.78	0.73
Interdependent	4.71	0.67

Subsequently, independent *t*-tests were carried out to examine whether the difference in scores from the SCS questionnaires had any influence on the infants who passed or did not pass the body self-awareness and mirror-recognition tasks.

In relation to the body self-awareness task the average score for the independent questions was the same in both the 'pass' and 'not pass' groups ($M = 4.78$), however, the scores varied slightly more in the pass group ($SD = 0.90$) than in the not pass group ($SD = 0.61$). In addition, the average score for the interdependent questions was slightly higher in the pass group ($M = 4.72$, $SD = 0.44$) when compared to the not pass group ($M = 4.70$, $SD = 0.88$). The results indicate that there was no significant difference in the independent scores, $t(10) = 0.00$, $p = 1.00$, or the interdependent scores, $t(10) = -0.04$, $p = .968$, in relation to the infants who passed or did not pass the body self-awareness task. Regarding the mirror-recognition

task the average score for the independent questions was slightly higher in the pass group (M = 4.87, SD = 0.15) than in the not pass group (M = 4.76, SD = 0.85), and the average score for the interdependent questions was higher in the not pass group (M = 4.82, SD = 0.40) when compared to the pass group (M = 4.37, SD = 1.26). The results indicate that there was no significant difference in the independent scores, $t(10) = -0.22$, $p = .832$, or the interdependent scores, $t(2.13) = 0.62$, $p = .597$, in relation to the infants who passed or did not pass the mirror-recognition task. The assumption of homogeneity of variance was checked for these test results, and Levene's Equality of Variances test proved significant for the interdependent scores in relation to the infants who passed and did not pass the mirror-recognition task. As such, the set of results above were corrected to reflect this.

Discussion

Within this section the findings from the present study will be explored in more detail together with its limitations. In addition, the implications for future research will be examined.

As part of the present study, and in relation to the results of other research (Moore et al., 2007), it was hypothesised that there would be an association between infant mirror-recognition and body self-awareness. Additional aims of the current study were to explore how typical mother-child interactions may influence infant self-awareness and whether there were any links between object awareness and body self-awareness. As such, the results of the present study did not support the hypothesis that there would be an association between infant mirror-recognition and body self-awareness. In addition, observations found there to be no influence of typical mother-child interactions on infant self-awareness, and no link between object awareness and body self-awareness.

With regards to the mother-child cup and mirror play sessions, despite there being significant differences in the frequencies of the mother-child interactions in relation to four of the separate types of interactions, these differences were attributed more to the logistics of the play sessions themselves. Mothers were deemed more likely to spend a greater number of intervals behind their child during the mirror play session than in the cup play due to the need to position their child in front of the mirror; modelling gestures were used more during the cup play session perhaps due to the nature of the interactions with the cups and the mothers' desire to show their child how to use them; affectionate gestures were possibly more prevalent during the mirror play as the nature of the task engendered more playful interactions; and the lack of mother gaze in the cup play was perhaps due to the focus being

more on the cups themselves, whereas during the mirror play exercise the mother's focus was more on her child.

Apart from two of the independent *t*-tests, the remaining 26 tests found no significant differences between the frequencies of the different mother-child interactions and those infants who passed or did not pass the shopping trolley self condition and mirror-recognition task. Even then, the two significant test results were found to violate the assumption of homogeneity of variance meaning that the data were not normally distributed; this could be attributed to the small sample size which will be discussed in due course. Nevertheless, these significant test results suggest that increased frequencies in face-to-face contact and suggestive gestures from the mothers meant that *less* children passed the mirror-recognition test. These findings conflict with existing studies where such interactions are believed to actually contribute to increased success in the passing of the mirror-recognition test (e.g., Fogel, 1993; Jaffe et al., 2001; Keller et al., 2005; Lavelli & Fogel, 2002). Despite these two findings, the lack of any other significant results suggests that the observed frequencies of the mother-child interactions did not influence the infants that passed or did not pass the body self-awareness and mirror-recognition tasks. It should also be noted that, due to the number of tests which were carried out, the researcher considered conducting a Bonferroni correction on the data, however, research suggests that such corrections are unnecessary and can reduce the statistical power of results (e.g., Perneger, 1998; Rothman, 1990). Indeed, given the small sample size within the present study it was not deemed appropriate to risk reducing the statistical power any further.

A total of nine out of the 12 children passed the self condition within the shopping trolley task, which is more than might have been expected given that the mother-infant dyads recruited in the present study were from Western cultures where the individualist ethos is more dominant. Indeed, body self-awareness is believed to be observed more frequently in

infants from collectivist cultures where the emphasis relates to their interconnection with the wider family (Markus & Kitayama, 1991) and where the mother effectively acts as an extension of her child's body (e.g., Keller et al., 2004, 2005; Tamis-LeMonda et al., 2008). The large proportion of infants passing the body self-awareness task in the present study occurred despite the fact that there were a lack of typical collectivist behaviours such as directive gestures, directive spoken phrases, and body contact from the mothers. The lack of such interactions corroborates other research regarding how Western cultures aim to promote the autonomy and individuality of the child (McCollum et al., 2000). Indeed, given the greater number of intervals of infant reference, mother gaze, and suggestive and modelling gestures observed during the mother-child play sessions it might have been expected that more children would have passed the mirror-recognition test (Keller et al., 2005), however, only three out of the 12 children passed this task. In summary, although the mothers' interactions in the present study corroborate research into Western parenting, the results appear to link more to what would be expected from non-Western mother-child dyads (McCollum et al., 2000).

There was no association found between infants passing both the shopping trolley self condition and the mirror-recognition condition. This finding contradicts research by Moore et al. (2007) who found a positive correlation between infants who passed the body self-awareness and mirror-recognition tests. It should be noted, however, that Moore and colleagues make reference to the fact that their sample size was relatively small, the 'magnitude of the correlation was not huge' (p.170) and that the results between the two tasks differed significantly. As such, the correlation between the development of mirror-recognition and body self-awareness may have been overstated in Moore et al.'s (2007) study. Despite there being no association found in the present study, which might have been expected given the small sample size, the raw data confirm that only one infant out of the 12

passed both of these conditions. This raises questions as to whether there are any actual links between the development of these two aspects of infant self-awareness, or whether they do in fact develop separately (Rochat, 2003).

There was no association discovered between object awareness and body self-awareness, which appears to clarify the findings of other studies (e.g., Brownell et al., 2007; Moore et al., 2007), however, it should be remembered that the results in the present study may not have sufficient statistical power to be able to generalise them to the wider population (Field & Hole, 2003).

In relation to the Self-Construal Scale (SCS, Singelis, 1994), there were no links found between the mothers' scores on each measure and the infants who passed or did not pass the body self-awareness and mirror-recognition tasks. As was previously discussed, levels of independence and interdependence appear to run along a continuum, as opposed to being polar opposites, and it is possible for people from one cultural background (e.g. Western) to possess traits of those observed in another culture (e.g. non-Western) and vice versa. This was observed in the similarity of the independent and interdependent SCS scores for the majority of the mothers within the present study, however, the reliability and validity of this measure in terms of its links with outcome variables has already been scrutinised (e.g., Kanagawa et al., 2001; Kitayama, 2002; Levine et al., 2003; Markus & Kitayama, 1998; Miramontes, 2011). One question which was elicited from the results of the present study was whether the SCS is purely measuring culturally-specific traits, or whether it is inadvertently measuring elements reflecting the 'status' of the person at the time they complete the questionnaire. Although this sample was taken from a Western population, the similarity in the independent and interdependent scores may be more of a reflection of the women's current status as both 'individuals' and 'mothers', with the latter being a role in which another person's needs (i.e. the child's) are placed before their own. The role of 'mother' may

engender aspects of a collectivist ethos relating to 'the consideration of others' whilst simultaneously encompassing the mother's existing attitudes from within their 'individual' self-concept (Tamis-LeMonda et al., 2008). As such, the dominant Western stance of individualism may be displaced during certain life events, such as becoming a parent, as this role involves the alteration of priorities and the need to put another person's requirements before one's own. It may also be the case that Western cultures are more adaptable with regards to incorporating different attitudes, perhaps because the very notion of individualism encourages the independence of thought and action (McCollum et al., 2000). In comparison, self-construal scores of mothers from non-Western cultures might be consistently higher for the interdependent measure, in comparison to the independent measure, as the collectivist ethos is more dominant in such cultures (Markus & Kitayama, 1991). In addition, if individualism has never been encouraged it may not necessarily be a trait which is cultivated unless people are exposed to such attitudes. Even then, it might be difficult to change one's mindset if one has been brought up in a culture firmly rooted in certain belief systems, however, research has found this to be possible (Georgas, 1989). Nevertheless, the results of the present study appear to corroborate other research which suggests that the scale may currently lack the reliability and validity needed to draw any firm conclusions from its use (e.g., Kanagawa et al., 2001; Kitayama, 2002; Levine et al., 2003; Markus & Kitayama, 1998; Miramontes, 2011).

The above findings did not meet the hypothesis that there would be an association between infant mirror-recognition and body self-awareness. Neither were any links found between typical mother-child interactions and infant self-awareness, and between object awareness and body self-awareness. However, this does not necessarily mean that no associations exist; there were limitations to the present study which need to be taken into account. Perhaps most notable was the small number of participants that the researcher was able to recruit in the

allotted timeframe, which may have reduced the statistical power of the results. As such, this may mean that the present study's sample, and the results found therein, are not representative of the general population (Field & Hole, 2003). It is therefore recommended that larger sample sizes (e.g. preferably exceeding 25 dyads) are used in future studies.

In addition, it was not possible to carry out a longitudinal study, which is significant considering that previous research has discovered that infant self-awareness appears to develop as infants grow older (e.g., Amsterdam, 1972; Bertenthal & Fischer, 1978; Nielsen et al., 2003). It was therefore not possible to observe this gradual development within the present study and only one result was obtained for each child within the designated age range. As such, further research would benefit from a longitudinal approach utilising the same participants between the ages of 15-24 months old which are the minimum and maximum ages at which self-awareness is believed to occur (e.g., Courage et al., 2004; Lewis & Brooks-Gunn, 1979; Moore et al., 2007).

Because convenience sampling was used, again due to time constraints, all participants lived within areas local to the researcher which may mean that the results cannot be generalised to the wider population (Field & Hole, 2003), however, further investigation regarding convenience sampling and the validity of results derived from such sampling methods has been deemed necessary (Hultsch, MacDonald, Hunter, Maitland, & Dixon, 2002). In relation to the areas from where the participants were recruited, the present study elicited data giving only a Western perspective on how caregiver-child interactions impact upon infant self-awareness. Whilst frequency data were collected for the mothers' interactions and spoken phrases, it was hard to draw any conclusions from these frequencies as there was nothing against which to compare the figures (i.e. to determine whether they were high or low). Cross-cultural studies of mother-child interactions would enable such comparisons and may elicit further information relating to culturally-specific parenting practices and how these

influence infant self-awareness. Indeed, it is intended that the data from the present study be amalgamated with an existing cross-cultural study into infant self-awareness that is yet to be published (Ross et al., in press). Ross et al.'s study has used the same experimental conditions and research methods, and it is hoped that the results will provide more information relating to cross-cultural parenting styles and the links with the attainment of self-awareness.

Another possible limitation of the present study relates to the locations in which the experiments were conducted. The experiments were carried out in settings dependent on where the participants were able to attend; some were conducted at the University of Chester whilst the majority were carried out in participants' homes. Conducting all of the studies in participants' homes might have been preferred as one would hope to see more naturalistic behaviours displayed in such settings (Schmuckler, 2001), however, there were sometimes potential distractions when the experiments were conducted in participants' homes (e.g. other toys, or other relatives/children present). Although the experiments that were conducted under laboratory conditions sacrificed these naturalistic settings, it was easier to control for any potential extraneous variables which may have impacted upon the mother-child interactions and the child's behaviours during the self-awareness tasks. Future studies may benefit from being conducted in specially-designed laboratories that are constructed to imitate the layout of a typical household, thereby mimicking naturalistic settings whilst controlling for extraneous variables (Peterson, Homer, & Wonderlich, 1982).

It should also be noted that the researcher was occasionally uncertain of how to code some of the data (i.e. determining in which category the data belonged). This meant that they had to employ their subjective view of what they had observed, however, the reliance upon one observer's interpretations can generate questions regarding the reliability and validity of observational research (Rowley, 1976). One method of increasing the reliability and validity

of such research is to have the data coded a second time by, for example, a research assistant. The second coder should have knowledge of the study, but ideally would not be told what the observations were aiming to find; this would hopefully eliminate any potential biases in their coding (Sim & Wright, 2005). However, this 'inter-rater reliability' was not tested in relation to the coding process in the present study which may have given greater weight to the results; it is therefore recommended that this procedure be included in future studies.

Despite the limitations in the present study, the continuation of research into this area of child development is important. Studies have found that neglectful parenting (whether intentional or unintentional) can impact upon a child's developmental milestones, with self-awareness being deemed as one such milestone (e.g., Bowlby, 1973; De Wolff & van IJzendoorn, 1997; Ferrier-Lynn & Skouteris, 2008; Schneider-Rosen & Cicchetti, 1991; Winnicott, 1971). As such, further studies in this area may help researchers to identify the potential reasons as to *why* particular developmental milestones are not being met in certain children. In addition, the application of such research findings may enable practitioners to work more effectively with parents who have children who present with developmental delays.

In conclusion, because of the lack of any significant findings in the present study it is difficult to draw any firm inferences from the results. There was no association found between infant mirror-recognition and body self-awareness, or object awareness and body self-awareness. In addition, observations found there to be no influence of typical mother-child interactions on infant self-awareness. As such, the small sample size and sampling method may have played a part in the lack of statistical power of the results (Field & Hole, 2003), and further investigation is needed into the reliability and validity of the SCS (Singelis, 1994) if it is to be used in future cross-cultural studies into infant self-awareness. Future research, which takes account of the limitations of the present study, may help to elicit further understanding regarding the influence of typical mother-child interactions, and the cultural variations found

therein, on infant self-awareness. It may also help to inform the work in applied psychological settings where practitioners come into contact with children who present with developmental delays.

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Appendices

Appendix A: Ethical Approval Sheet

University of Chester

UNIVERSITY OF CHESTER
DEPARTMENT OF PSYCHOLOGY
APPLICATION TO DEPARTMENTAL ETHICS COMMITTEE REVIEW FORM

Form Instructions:
Press TAB or SHIFT TAB to move between boxes and enter an 'X' or text.
REVIEWING UNDERGRADUATE AND TAUGHT POSTGRADUATE STUDENTS:
Project supervisors act as first reviewers. Attach copy of completed review to back of application and forward to the allocated second reviewer.
Second reviewer should complete their review, attach to application form and review 1 and submit to ethics committee via the department office by the deadline for submission date.
REVIEWING POSTGRADUATE RESEARCH STUDENTS
Two allocated members of the ethics committee will be appointed to conduct independent reviews. Once completed attach to application form and submit to departmental ethics committee via the department office by the deadline for submission date.
REVIEWING STAFF APPLICATIONS
Two allocated members of the ethics committee conduct anonymous reviews. Once complete, submit to the ethics committee via the department office by the deadline for submission date.

A) **Review type**

UG/PGT REVIEWS:	**Supervisor/reviewer 1**	☒	**Reviewer 2**	☐	**Reviewer 3**	☐
PGR REVIEWS:	**Reviewer 1**	☐	**Reviewer 2**	☐	**Reviewer 3**	☐
STAFF REVIEWS:	**Reviewer 1**	☐	**Reviewer 2**	☐	**Reviewer 3**	☐

B) **Applicant and personnel**

Name of applicant: Joanne Robinson
Project title: Social factors which influence the development of self-awareness in infants
Applicant status: STAFF ☐→ Go to Section C
☐ UG ☒PGT☐PGR If you are the applicant's supervisor, have you discussed ethical issues with the applicant?
☐Yes → Go to Section C ☐No → Comments: Click here to enter text.
Has the applicant signed and dated the form? ☒Yes → Go to Section C
☐No → **Forms must be signed. Return to applicant for signature before continuing with review process.**

C) **Review of application**

1. Has the applicant shown appropriate awareness of ethical issues in the research plan and methodology? In particular, have they appropriately considered how to minimise, manage and monitor issues of distress and harm? (this information will be in section E & G)
   ☒Yes ☐No Comments: Click here to enter text.

2. Has the applicant provided full details of participants? (this information will be in section F)
   ☒Yes ☐No Comments: Click here to enter text.

3. Has the applicant provided appropriate details of where the research will take place, including issues regarding permission and appropriate health and safety information?. (this information will be in section F)
   ☒Yes ☐No Comments: Click here to enter text.

University of Chester

UNIVERSITY OF CHESTER DEPARTMENT OF PSYCHOLOGY
APPLICATION TO DEPARTMENTAL ETHICS COMMITTEE

YOU HAVE NOW COMPLETED THE APPLICATION FORM. PLEASE READ AND SIGN THE FOLLOWING DECLARATION:

I confirm that I have read and familiarised myself with the contents of:
BPS Code of Ethics and Conduct (2009)
Department of Psychology Ethical Approval for Research: Procedural Guidelines Handbook and any other relevant documentation.
I confirm I understand that:
All applications must be submitted according to the guidelines set out, assessed by at least 2 reviewers and are subject to discussion by departmental ethics committee. Data collection is not permitted until applications have been approved.
Collecting data without ethical approval is a serious breach of the BPS Code of Ethics.
Any change of plans to the research after the approval MUST be discussed by ethics committee. Chair's action may be taken for minor changes.

Print the completed form off onto BLUE paper with the appendices on white paper. Handwritten applications are not accepted. Submit to the department office at least one week before an ethics committee meeting. Applications submitted after this deadline will not be processed until the following committee meeting.
If you are a member of staff or a PGR student, in addition to 2 paper copies you MUST submit an electronic version to c.leach@chester.ac.uk.

DATE: 20/03/2013

PRINT NAME: Joanne Robinson

SIGNATURE: 

NOTES ON THE ROLE AND FUNCTION OF THE DEPARTMENT OF PSYCHOLOGY ETHICS COMMITTEE.

- *All decisions of the committee are based on the application form and reviewers comments ONLY. Forms should be as detailed and clear as possible. Verbal discussions are not considered as part of the application or review process.*
- *The review process strictly adheres to the BPS Code of Ethics.*
- *The decision of the committee is final. If you are a UG, PGT or PGR student you should discuss the decision of the committee with your supervisor. If you are a member of staff you may contact the Chair of the committee for further clarification.*

ETHICS COMMITTEE DATE : Click here to enter a date.

CHAIRS COMMENTS: Click here to enter text.

☑ ACCEPTABLE

Action: You may now commence with data collection subject to approval from any relevant external agencies

DATA COLLECTION IS NOT PERMISSABLE UNDER THESE CONDITIONS

☐ ACCEPTABLE SUBJECT TO DISCUSSION WITH SUPERVISOR

Action: Discuss conditions highlighted / Discuss conditions highlighted with supervisor and submit Ethics Application Amendment Form direct to department office

☐ ACCEPTABLE SUBJECT TO CONDITIONS LISTED BY CHAIR:

Action: Resubmit application for full review ensuring you have completed section B

☐ REVISE AND RESUBMIT:

Action: Resubmit application for full review ensuring you have completed section B

[redacted]

10/4/13.

Office Use Only ***DOPEC NUMBER***

Appendix B: Recruitment poster

Calling all mums and babies in Staffordshire and Cheshire!

Would you and your child like your child to be part of a fun piece of research for a psychology masters project?

Is your baby 15-18 months old?

You will receive a DVD of you and your child for taking part in the study.

For more information please contact Jo Robinson, at the University of Chester

Email: xxxxxxx@chester.ac.uk

Tel: xxxxx xxx xxx

University of Chester

Appendix C: Information and consent form

Information and Consent Sheet

Title of research project:	The development of self-awareness in infants
Researcher name:	Jo Robinson
Researcher contact details:	Email: xxxxxxx@chester.ac.uk Mobile: xxxxx xxx xxx
Topic area of the research:	Infant self-awareness and the social factors which may influence the age at which this is attained.

This research is being conducted as part of the researcher's Psychology (Conversion) Masters at the University of Chester. The research is supervised by Dr Mandy Yilmaz, Lecturer in Developmental Psychology. You are welcome to contact Mandy if you have any questions about this research on xxxxxxx@chester.ac.uk

Why have you been chosen?
Research regarding the age at which infants become self-aware has found that some become self-aware early at 15 months, whilst others will not show signs until 24 months. The aim of this study is to explore how social factors may impact upon the developmental process.

We would like to thank all mothers and their children in advance for taking an interest in this study.

What is required from participants?

- Both you and your child are asked to take part in a single experimental session which will be approximately one hour in duration. The session will be conducted either within your home or at the University of Chester, whichever is more convenient for you. The researcher will be accompanied by a helper who will assist with carrying the equipment and holding the video camera.

- The whole session will be video-taped and the video footage will then be taken away by the researcher for analysis. You will be given a copy of this DVD as a token of our appreciation for partaking in the study. Dr Yilmaz has previously conducted similar research, and families have reported how they found the session to be enjoyable and fun. The DVD is also a lovely keepsake to look back on with your child.

- You will be asked to complete two questionnaires, one of which gathers further information about yourself and your child (e.g. your child's date of birth, and you/your partner's occupation); the other questionnaire asks questions regarding cultural beliefs (e.g. "I enjoy being unique and different from others in many respects"). The questionnaires are voluntary therefore you do not have to answer any questions that you do not want to.

- Once you have completed your questionnaires, we will allow 5-10 minutes for your child to become accustomed to the researcher and the apparatus. Whilst your child completes the play session the researcher will capture and observe them via video-recorder. Your child will be asked to take part in two play sessions:
  1) **Mirror play** – at some point we will place a harmless sticker on your child's forehead as we are interested in how they will react to their reflection when they see the sticker in the mirror;
  2) **The shopping trolley (two tasks)** – prior to the tasks we will make sure that your child is comfortable to push the trolley. We will firstly place a paint pot, filled with sand, on a mat attached to the back of the trolley, ask your child to push the trolley and see how they respond; we

will then place your child onto the mat, again ask them to push the trolley and observe their reactions.

Confidentiality

- Although both you and your child's names will be written on the consent form, these will be locked away in Dr Yilmaz's office, together with the questionnaires and recording.

- Only blank versions of the questionnaires will be provided as an appendix to the final report. The consent form will only be seen by the researcher's supervisor at The University of Chester and, in some cases, the external markers. We may wish, with your consent, to use the video for educational purposes but no identifying details will be made visible within the public domain.

- The consent form will be stored separately to the video-recording and questionnaires in order to avoid any links with personal details and information gathered in the session.

The experiment

- Dr Yilmaz has previously conducted similar research, and mums have reported how fun they found the session to be, however, if you or your child feel uncomfortable or distressed during the session it can either be stopped temporarily, be rearranged for another day and time, or you can decide to withdraw completely. Any partially completed questionnaires and/or video recordings will be destroyed immediately. If, subsequent to completing the session, you no longer wish for the questionnaires and video-recording to be used then there will be a period of **one month** from the date of the interview in which to contact the researcher to inform them of your decision. *You do not have to give reasons for wanting to withdraw from the research.*

- You will be debriefed after all the tasks have been completed to ensure that both you and your child are happy to end the session.

- We are carrying out this for research purposes only; any concerns regarding your child's health should be directed to your doctor or health visitor.

Analysis of the research

- The researcher will review and code the video recordings of your child, and your responses to the questionnaires will also be included in the final report. The researcher may look to submit this research to a journal for publication and anonymised data from the experiment may be used for this purpose. Data from this study will also be used to contribute to other studies within the same field. *The researcher will ensure that any identifying details are changed and/or removed in order to protect you and your child's anonymity.*

What are the possible benefits of taking part?

- The knowledge that you and your child will have contributed towards further understanding regarding the subject of infant self-awareness.
- You will receive a DVD of the video-recording of the session as a 'thank you' for taking the time to participate in this study.
- It's fun!

The University Research Ethics Committee of the University of Chester has reviewed and approved this research study.

Participant No.

The development of self-awareness in infants

CONSENT FORM

Please circle the appropriate response		
Have you read and understood the volunteer information sheet?	Yes	No
Have you been given an opportunity to ask questions and further discuss the study?	Yes	No
Have you received satisfactory answers to all of your questions?	Yes	No
Have you now received enough information about this study?	Yes	No
Do you understand that your participation in this study is entirely voluntary?	Yes	No
Do you understand that you are free to withdraw from this study at any time?	Yes	No
Do you understand that you are free to withdraw from this study without having to give a reason for withdrawing?	Yes	No
Do you agree to take part in this study that will involve filming you and your child?	Yes	No
Do you agree to the members of our research team viewing the videotapes?	Yes	No
Do you agree to the publication/presentation of the findings in this research?	Yes	No
Do you agree to the presentation or use of the video for educational purposes within the University of Chester?	Yes	No
Do you agree to the presentation or use of video footage for educational purposes out with the University of Chester (e.g. Academic Conferences, Professional seminars)?	Yes	No

Signature of mother:……...……..…… Date:..……...……..

Mothers name in block capital letters:……..……..……

Child's name in block capital letters: ……...……...

Child's date of birth: ……

Address: ……..

……..

Signature witnessed by: …… Date:…….

Witness name in block capital letters:……

Appendix D: Demographic questionnaire

Please answer the following questions as best as you can. The questionnaire is voluntary therefore you do not have to answer any questions that you do not want to.

1. **What is your child's date of birth?**
   .....

2. **Has your child had any medical problems since birth?**
   Yes
   No
   If you answered yes, please explain what the problem is/has been:

   .....

   .....

   .....

3. **Do you have any other children? If so, what are their dates of birth?**

   .....

4. **Where does your child normally sleep at night? (please circle your response)**

   Their own bed?
   With their brother or sister?
   With parent(s)?
   Other?

5. **When did your child begin to walk? (in months)**

   .....

6. **Do you own a mirror at home? (please circle your response)**

   Yes
   No

7. **Has your child had experience with a mirror before? (please circle your response)**

   Frequently
   Sometimes
   Rarely
   Never

8. **Has your child had experience with a toy shopping trolley before? (please circle your response)**

   Frequently
   Sometimes
   Rarely
   Never

9. **Does your child have toys like these ones at home? (show toys for play session)**

   Yes
   No

10. **Do you play with your child with toys like these? (please circle your response)**

    Frequently
    Sometimes
    Rarely
    Never

11. **Do you play with your child without toys? (please circle your response)**

    Frequently
    Sometimes
    Rarely
    Never

    If you answered yes to the above, how do you typically play?

    .....

    .....

    .....

12. **What are you and/or your partner's occupation?**

    .....

    .....

13. **How would you describe your child?**

    .....

    .....

    .....

    .....

For experimenter’s use only:

Name of experimenter:
.....

Dyad number:
.....

Date completed:
.....

Location of experiment (town/city & home/nursery/university):
.....

Appendix E: Self-Construal Scale (SCS)

INSTRUCTIONS

This is a questionnaire that measures a variety of feelings and behaviors in various situations. Listed below are a number of statements. Read each one as if it referred to you. Beside each statement write the number that best matches your agreement or disagreement. Please respond to every statement. Thank you.

1=STRONGLY DISAGREE	4=DON'T AGREE OR	5=AGREE SOMEWHAT
2=DISAGREE	DISAGREE	6=AGREE
3=SOMEWHAT DISAGREE		7=STRONGLY AGREE

____1. I enjoy being unique and different from others in many respects.

____2. I can talk openly with a person who I meet for the first time, even when this person is much older than I am.

____3. Even when I strongly disagree with group members, I avoid an argument.

____4. I have respect for the authority figures with whom I interact.

____5. I do my own thing, regardless of what others think.

____6. I respect people who are modest about themselves.

____7. I feel it is important for me to act as an independent person.

____8. I will sacrifice my self interest for the benefit of the group I am in.

____9. I'd rather say "No" directly, than risk being misunderstood.

____10. Having a lively imagination is important to me.

____11. I should take into consideration my parents' advice when making education/career plans.

____12. I feel my fate is intertwined with the fate of those around me.

____13. I prefer to be direct and forthright when dealing with people I've just met.

____14. I feel good when I cooperate with others.

____15. I am comfortable with being singled out for praise or rewards.

____16. If my brother or sister fails, I feel responsible.

____17. I often have the feeling that my relationships with others are more important than my own accomplishments.

____18. Speaking up during a class (or a meeting) is not a problem for me.

____19. I would offer my seat in a bus to my professor (or my boss).

____20. I act the same way no matter who I am with.

____21. My happiness depends on the happiness of those around me.

____22. I value being in good health above everything.

____23. I will stay in a group if they need me, even when I am not happy with the group.

____24. I try to do what is best for me, regardless of how that might affect others.

____25. Being able to take care of myself is a primary concern for me.

____26. It is important to me to respect decisions made by the group.

____27. My personal identity, independent of others, is very important to me.

____28. It is important for me to maintain harmony within my group.

____29. I act the same way at home that I do at school (or work).

____30. I usually go along with what others want to do, even when I would rather do something different.

For experimenter's use only:

Name of experimenter:
.....

Dyad number:
.....

Date completed:
.....

Location of experiment (town/city & home/university):
.....

Appendix F: Coding and transcription sheet

Infant self-awareness Project Coding

Number = **Age=**

Country= **Gender=**

Stacking Cup play

Coded in 5 second intervals, tick box which applies to majority of interval (indicate when footage ends)

Positioning

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Face																		
Diagonal																		
Side																		
Back																		

Face=dyads directly facing one another
Diagonal=dyads partially faced one another
Side=dyads side by side
Back=infant has back to mother

Body contact

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Supportive																		
Sitting																		
Close																		
None																		

Supportive=mother touching or holding child
Sitting=child sitting on mother's lap
Close=child sitting on mother's lap and upper bodies touching
None=no physical contact

Actions

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Direction																		
Suggestion																		
Modelling																		
Affectionate																		
No action																		

Direction=the mother directly physically controlled the child's playing with the cup
Suggestion = the mother pointed to or held a cup towards the child
Modelling=the mother played with the cups without physically involving the child
Affectionate=the mother pats/tickles the child
No action=the mother did not physically play with cup or child

Eye Gaze

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Mother																		
Infant																		
Mutual																		
None																		

Mother=mother looks at infant
Infant=infant looks at mother
Mutual=both look at each other
None=neither seeks eye contact

Verbal contact cup play

Translate word for word what is said by the mother during the cup play:

	Time on video (mins: secs)		**Transcription of mum**
Interval	**From**	**To**	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Total number of discrete phrases (separated by punctuation):

How many phrases are directive (i.e. contain instruction such as do this, put it etc.)?:

How many phrases are affirmative (e.g. well done, wow!, that is good)?:

How many direct references to the infant (you, he/she, they, John, nickname such as sweetie) are made?:

Mirror play

Coded in 5 second intervals, tick box which applies to majority of interval (indicate when footage ends)

Positioning

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Face																		
Diagonal																		
Side																		
Back																		

Face=dyads directly facing one another
Diagonal=dyads partially faced one another
Side=dyads side by side
Back=infant has back to mother

Body contact

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Supportive																		
Sitting																		
Close																		
None																		

Supportive=mother touching or holding child
Sitting=child sitting on mother's lap
Close=child sitting on mother's lap and upper bodies touching
None=no physical contact

Actions

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Direction																		
Suggestion																		
Modelling																		
Affectionate																		
No action																		

Direction=the mother directly physically controlled the child's playing with the mirror
Suggestion = the mother pointed to the mirror
Modelling=the mother played with the mirror without physically involving the child
Affectionate=the mother pats/tickles the child
No action=the mother did not physically play with mirror or child

Eye Gaze

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Mother																		
Infant																		
Mutual																		
None																		

Mother=mother looks at infant
Infant=infant looks at mother
Mutual=both look at each other
None=neither seeks eye contact

Verbal contact mirror play

Translate word for word what is said by the mother during the mirror play:

	Time on video (mins: secs)		**Transcription of mum**
Interval	**From**	**To**	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Total number of discrete phrases (separated by punctuation):

How many phrases are directive (i.e. contain instruction such as do this, look in the mirror etc.)?:

How many phrases are affirmative (e.g. well done, wow!, that is good)?:

How many direct references to the infant (you, he/she, they, John, nickname such as sweetie) are made?:

Body-as-obstacle task

Trolley play

Action

Runs away from situation	
Won't push trolley	
Pushes trolley after prompting	
Pushes trolley spontaneously	

Self trolley task

Runs away from situation	
Won't stand on mat or push trolley	
Won't stand on mat or push trolley but tries to remove mat	
Won't stand on mat but pushes trolley	
Stays on mat and tries to push trolley	
Stays on mat and tries to lift trolley	
Steps off mat and pushes trolley after prompting	
Steps off mat and pushes trolley spontaneously	

Object trolley task (paint pot)

Runs away from situation	
Won't stand on mat or push trolley	
Won't stand on mat or push trolley but tries to remove mat	
Won't stand on mat but pushes trolley	
Not comfortable with the paint pot and appears to try and move it off of the mat*	
Pushes the trolley with the paint pot still on top of the mat**	
Stays on mat and tries to push trolley	
Stays on mat and tries to lift trolley	
Steps off mat and pushes trolley after prompting	
Steps off mat and pushes trolley spontaneously	

*Interacting with the paint pot = the object condition has been passed

**Pushing trolley with paint pot still on mat = the object condition has been passed

Mirror task

Mirror play

Runs away from situation	
Won't stand in front of mirror	
Stands in front of mirror but is inhibited	
Plays in mirror/stands in front of mirror confidently	
Points at self in mirror	

Mark test

Runs away from situation	
Won't stand in front of mirror	
Stands in front of mirror but is inhibited	
Plays in mirror/stands in front of mirror confidently	
Points at self in mirror	

Mark directed behaviour

Does not reach for the sticker	
Points at self or mark in mirror	
Reaches for the sticker after prompting	
Spontaneously reaches for the sticker	

Reaching for sticker = raising arm to face and touching within 3cm of the sticker

Appendix G: Outputs from SPSS

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
DyadNumber	12	1.00	12.00	6.5000	3.60555
Nationality	12	1.00	1.00	1.0000	.00000
Gender	12	1	2	1.58	.515
Consent	12	1.00	1.00	1.0000	.00000
Age_months	12	15	18	16.25	1.138
When did they start walking	12	9.00	15.00	12.2083	1.69837
Do they own a mirror	12	1	1	1.00	.000
Previous experience with mirror	12	1	2	1.42	.515
Previous experience with trolley	12	1	4	3.58	.900
Own toys like stacking cups	12	0	1	.92	.289
Total number of intervals spent facing each other during cup play	12	.00	18.00	4.0833	6.80185
Total number of intervals spent sitting diagonally across from each other during cup play	12	.00	18.00	10.5833	8.11797
Total number of intervals spent side by side during cup play	12	.00	18.00	1.5833	5.17790
Total number of intervals spent with infants back to mother during cup play	12	.00	18.00	1.6667	5.17570
What position do they spend the majority of time in during cup play?	12	1	4	3.25	1.215
Total number of intervals spent in supportive position during cup play	12	.00	11.00	1.0833	3.14667
Total number of intervals spent in sitting position during cup play	12	.00	.00	.0000	.00000
Total number of intervals spent in close position during cup play	12	.0	7.0	.583	2.0207

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Sum of supportive, sitting, close during cup play	12	.00	18.00	1.6667	5.15811
Total number of intervals including directive gestures during cup play	12	.00	4.00	1.5000	1.44600
Total number of intervals including suggestive gestures during cup play	12	.00	8.00	4.2500	2.49089
Total number of intervals including modelling gestures during cup play	12	2.0	10.0	6.333	3.0251
Total number of intervals including affectionate gestures during cup play	12	.00	1.00	.0833	.28868
Total number of intervals where mother looks at infant during cup play	12	2.00	14.00	7.9167	4.37884
Total number of intervals where infant looks at mother during cup play	12	.00	.00	.0000	.00000
Total number of intervals including mutual eye gaze during cup play	12	.00	2.00	.4167	.66856
Total number of phrases spoken by mother (split by normal punctuation) during cup play	12	9.00	48.00	27.1667	11.77697
Total number of directive phrases (do that, put this, move it) during cup play	12	2.00	12.00	5.7500	3.64629
Total number of affirmative phrases (well done, wow, yay!) during cup play	12	.00	7.00	1.4167	1.97523
Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during cup play	12	1.00	18.00	8.3333	5.28004
Directive/Total number of phrases during cup play	12	10.00	45.00	21.8333	11.06866
Affirmative/Total number of phrases during cup play	12	.00	21.00	5.0833	6.51513
Infant reference/Total number of phrases during cup play	12	9.00	47.00	28.3333	12.07050

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total number of intervals spent facing each other during mirror play	12	.00	6.00	1.0000	1.85864
Total number of intervals spent sitting diagonally across from each other during mirror play	12	.00	18.00	7.0000	7.86245
Total number of intervals spent side by side during mirror play	12	.00	1.00	.0833	.28868
Total number of intervals spent with infants back to mother during mirror play	12	.00	18.00	9.5000	7.52571
What position do they spend the majority of time in during mirror play?	12	2.00	4.00	2.8333	1.02986
Total number of intervals spent in supportive position during mirror play	12	.00	16.00	4.3333	4.57927
Total number of intervals spent in sitting position during mirror play	12	.00	.00	.0000	.00000
Total number of intervals spent in close position during mirror play	12	.0	3.0	.250	.8660
Sum of supportive, sitting, close during mirror play	12	.00	16.00	4.5833	4.92597
Total number of intervals including directive gestures during mirror play	12	.00	13.00	2.4167	3.75278
Total number of intervals including suggestive gestures during mirror play	12	.00	6.00	2.5833	1.88092
Total number of intervals including modelling gestures during mirror play	12	.0	5.0	1.750	1.7123
Total number of intervals including affectionate gestures during mirror play	12	.00	3.00	.9167	1.24011
Total number of intervals where mother looks at infant during mirror play	12	12.00	18.00	16.3333	1.82574

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total number of intervals where infant looks at mother during mirror play	12	.00	.00	.0000	.00000
Total number of intervals including mutual eye gaze during mirror play	12	.00	4.00	.8333	1.33712
Total number of phrases spoken by mother (split by normal punctuation) during mirror play	12	8.00	44.00	29.5000	11.78211
Total number of directive phrases (do that, look in the mirror) during mirror play	12	.00	12.00	5.0000	3.59292
Total number of affirmative phrases (well done, wow, yay!) during mirror play	12	.00	3.00	.2500	.86603
Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during mirror play	12	2.00	21.00	12.8333	7.79083
Directive/Total number of phrases during mirror play	12	.00	37.50	15.9583	10.08928
Affirmative/Total number of phrases during mirror play	12	.00	10.00	.8333	2.88675
Infant reference/Total number of phrases during mirror play	12	14.00	67.00	40.6667	15.76869
SelfTrolleyTask_Score	12	0	2	.67	.778
SelfTrolleyTask_PassFail	12	.00	1.00	.5000	.52223
ObjectTrolleyTask_Score	12	0	2	1.33	.778
ObjectTrolleyTask_PassFail	12	.00	1.00	.8333	.38925
MirrorTask_score	12	0	2	.50	.905
MirrorTask_passfail	12	.00	1.00	.2500	.45227
Total independent score (prior to averaging) out of a maximu of 105	12	48.00	89.00	71.6667	10.99035
Mean score for the independent SCS questions (total divided by 15)	12	3.20	5.90	4.7833	.73216

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total interdependent score (prior to averaging) out of a maximu of 105	12	48.00	85.00	70.6667	9.93921
Mean score for the interdependent SCS questions (total divided by 15)	12	3.20	5.70	4.7083	.66669
Valid N (listwise)	12				

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Total number of intervals spent facing each other during cup play	4.0833	12	6.80185	1.96352
	Total number of intervals spent facing each other during mirror play	1.0000	12	1.85864	.53654
Pair 2	Total number of intervals spent sitting diagonally across from each other during cup play	10.5833	12	8.11797	2.34346
	Total number of intervals spent sitting diagonally across from each other during mirror play	7.0000	12	7.86245	2.26969
Pair 3	Total number of intervals spent side by side during cup play	1.5833	12	5.17790	1.49473
	Total number of intervals spent side by side during mirror play	.0833	12	.28868	.08333

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 4	Total number of intervals spent with infants back to mother during cup play	1.6667	12	5.17570	1.49410
	Total number of intervals spent with infants back to mother during mirror play	9.5000	12	7.52571	2.17249

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Total number of intervals spent facing each other during cup play & Total number of intervals spent facing each other during mirror play	12	.209	.515
Pair 2	Total number of intervals spent sitting diagonally across from each other during cup play & Total number of intervals spent sitting diagonally across from each other during mirror play	12	-.181	.574
Pair 3	Total number of intervals spent side by side during cup play & Total number of intervals spent side by side during mirror play	12	.998	.000
Pair 4	Total number of intervals spent with infants back to mother during cup play & Total number of intervals spent with infants back to mother during mirror play	12	-.317	.315

Paired Samples Test

		Paired Differences					t
					95% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	Total number of intervals spent facing each other during cup play - Total number of intervals spent facing each other during mirror play	3.08333	6.66686	1.92456	-1.15258	7.31925	1.602
Pair 2	Total number of intervals spent sitting diagonally across from each other during cup play - Total number of intervals spent sitting diagonally across from each other during mirror play	3.58333	12.28050	3.54507	-4.21932	11.38599	1.011
Pair 3	Total number of intervals spent side by side during cup play - Total number of intervals spent side by side during mirror play	1.50000	4.88969	1.41153	-1.60676	4.60676	1.063
Pair 4	Total number of intervals spent with infants back to mother during cup play - Total number of intervals spent with infants back to mother during mirror play	-7.83333	10.39959	3.00210	-14.44092	-1.22575	-2.609

Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	Total number of intervals spent facing each other during cup play - Total number of intervals spent facing each other during mirror play	11	.137
Pair 2	Total number of intervals spent sitting diagonally across from each other during cup play - Total number of intervals spent sitting diagonally across from each other during mirror play	11	.334
Pair 3	Total number of intervals spent side by side during cup play - Total number of intervals spent side by side during mirror play	11	.311
Pair 4	Total number of intervals spent with infants back to mother during cup play - Total number of intervals spent with infants back to mother during mirror play	11	.024

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Sum of supportive, sitting, close during cup play	1.6667	12	5.15811	1.48902
	Sum of supportive, sitting, close during mirror play	4.5833	12	4.92597	1.42200

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Sum of supportive, sitting, close during cup play & Sum of supportive, sitting, close during mirror play	12	-.278	.382

Paired Samples Test

		Paired Differences					t
					95% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	Sum of supportive, sitting, close during cup play - Sum of supportive, sitting, close during mirror play	-2.91667	8.06179	2.32724	-8.03888	2.20555	-1.253

Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	Sum of supportive, sitting, close during cup play - Sum of supportive, sitting, close during mirror play	11	.236

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Total number of intervals including directive gestures during cup play	1.5000	12	1.44600	.41742
	Total number of intervals including directive gestures during mirror play	2.4167	12	3.75278	1.08333
Pair 2	Total number of intervals including suggestive gestures during cup play	4.2500	12	2.49089	.71906
	Total number of intervals including suggestive gestures during mirror play	2.5833	12	1.88092	.54298

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 3	Total number of intervals including modelling gestures during cup play	6.333	12	3.0251	.8733
	Total number of intervals including modelling gestures during mirror play	1.750	12	1.7123	.4943
Pair 4	Total number of intervals including affectionate gestures during cup play	.0833	12	.28868	.08333
	Total number of intervals including affectionate gestures during mirror play	.9167	12	1.24011	.35799

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Total number of intervals including directive gestures during cup play & Total number of intervals including directive gestures during mirror play	12	.511	.090
Pair 2	Total number of intervals including suggestive gestures during cup play & Total number of intervals including suggestive gestures during mirror play	12	.141	.663
Pair 3	Total number of intervals including modelling gestures during cup play & Total number of intervals including modelling gestures during mirror play	12	-.263	.408

Paired Samples Correlations

		N	Correlation	Sig.
Pair 4	Total number of intervals including affectionate gestures during cup play & Total number of intervals including affectionate gestures during mirror play	12	.275	.387

Paired Samples Test

		Paired Differences					t
					95% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	Total number of intervals including directive gestures during cup play - Total number of intervals including directive gestures during mirror play	-.91667	3.26018	.94113	-2.98809	1.15475	-.974
Pair 2	Total number of intervals including suggestive gestures during cup play - Total number of intervals including suggestive gestures during mirror play	1.66667	2.90245	.83787	-.17746	3.51080	1.989
Pair 3	Total number of intervals including modelling gestures during cup play - Total number of intervals including modelling gestures during mirror play	4.5833	3.8485	1.1110	2.1381	7.0285	4.126
Pair 4	Total number of intervals including affectionate gestures during cup play - Total number of intervals including affectionate gestures during mirror play	-.83333	1.19342	.34451	-1.59159	-.07507	-2.419

Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	Total number of intervals including directive gestures during cup play - Total number of intervals including directive gestures during mirror play	11	.351
Pair 2	Total number of intervals including suggestive gestures during cup play - Total number of intervals including suggestive gestures during mirror play	11	.072
Pair 3	Total number of intervals including modelling gestures during cup play - Total number of intervals including modelling gestures during mirror play	11	.002
Pair 4	Total number of intervals including affectionate gestures during cup play - Total number of intervals including affectionate gestures during mirror play	11	.034

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Total number of intervals where mother looks at infant during cup play	7.9167	12	4.37884	1.26406
	Total number of intervals where mother looks at infant during mirror play	16.3333	12	1.82574	.52705
Pair 2	Total number of intervals where infant looks at mother during cup play	.0000[a]	12	.00000	.00000
	Total number of intervals where infant looks at mother during mirror play	.0000[a]	12	.00000	.00000

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 3	Total number of intervals including mutual eye gaze during cup play	.4167	12	.66856	.19300
	Total number of intervals including mutual eye gaze during mirror play	.8333	12	1.33712	.38599

a. The correlation and t cannot be computed because the standard error of the difference is 0.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Total number of intervals where mother looks at infant during cup play & Total number of intervals where mother looks at infant during mirror play	12	-.053	.870
Pair 3	Total number of intervals including mutual eye gaze during cup play & Total number of intervals including mutual eye gaze during mirror play	12	-.220	.491

Paired Samples Test

		Paired Differences					t
					95% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	Total number of intervals where mother looks at infant during cup play - Total number of intervals where mother looks at infant during mirror play	-8.41667	4.83281	1.39511	-11.48729	-5.34605	-6.033
Pair 3	Total number of intervals including mutual eye gaze during cup play - Total number of intervals including mutual eye gaze during mirror play	-.41667	1.62135	.46804	-1.44683	.61349	-.890

Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	Total number of intervals where mother looks at infant during cup play - Total number of intervals where mother looks at infant during mirror play	11	.000
Pair 3	Total number of intervals including mutual eye gaze during cup play - Total number of intervals including mutual eye gaze during mirror play	11	.392

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Total number of directive phrases (do that, put this, move it) during cup play	5.7500	12	3.64629	1.05259
	Total number of directive phrases (do that, look in the mirror) during mirror play	5.0000	12	3.59292	1.03719
Pair 2	Total number of affirmative phrases (well done, wow, yay!) during cup play	1.4167	12	1.97523	.57020
	Total number of affirmative phrases (well done, wow, yay!) during mirror play	.2500	12	.86603	.25000

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 3	Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during cup play	8.3333	12	5.28004	1.52422
	Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during mirror play	12.8333	12	7.79083	2.24902

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Total number of directive phrases (do that, put this, move it) during cup play & Total number of directive phrases (do that, look in the mirror) during mirror play	12	.132	.683
Pair 2	Total number of affirmative phrases (well done, wow, yay!) during cup play & Total number of affirmative phrases (well done, wow, yay!) during mirror play	12	-.226	.480
Pair 3	Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during cup play & Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during mirror play	12	.264	.406

Paired Samples Test

		Paired Differences					t
					95% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	Total number of directive phrases (do that, put this, move it) during cup play - Total number of directive phrases (do that, look in the mirror) during mirror play	.75000	4.76970	1.37689	-2.28052	3.78052	.545
Pair 2	Total number of affirmative phrases (well done, wow, yay!) during cup play - Total number of affirmative phrases (well done, wow, yay!) during mirror play	1.16667	2.32900	.67232	-.31311	2.64644	1.735
Pair 3	Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during cup play - Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during mirror play	-4.50000	8.17424	2.35970	-9.69366	.69366	-1.907

Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	Total number of directive phrases (do that, put this, move it) during cup play - Total number of directive phrases (do that, look in the mirror) during mirror play	11	.597
Pair 2	Total number of affirmative phrases (well done, wow, yay!) during cup play - Total number of affirmative phrases (well done, wow, yay!) during mirror play	11	.111
Pair 3	Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during cup play - Total number of instances where infant referred to by pronoun (you, he, they) name (e.g. John) or pet name (sweetie, monkey) during mirror play	11	.083

Group Statistics

	SelfTrolleyTask_PassFail	N	Mean	Std. Deviation	Std. Error Mean
Total face to face in both cup and mirror play added together and divided by two	Fail	6	.8333	1.21106	.49441
	Pass	6	4.2500	4.66637	1.90504
Total diagonal in both cup and mirror play added together and divided by two	Fail	6	8.0000	4.72229	1.92787
	Pass	6	9.5833	5.80876	2.37142
Total side to side in both cup and mirror play added together and divided by two	Fail	6	1.5833	3.87836	1.58333
	Pass	6	.0833	.20412	.08333
Total behind position in both cup and mirror play added together and divided by two	Fail	6	7.5000	3.76829	1.53840
	Pass	6	3.6667	3.04412	1.24276
Total of supportive, sitting, and close positions in both cup and mirror play added together and divided by two	Fail	6	6.1667	5.71548	2.33333
	Pass	6	5.5000	5.46809	2.23234
Total directive gestures in both cup and mirror play added together and divided by two	Fail	6	1.1667	1.32916	.54263
	Pass	6	2.7500	2.94534	1.20243
Total suggestive gestures in both cup and mirror play added together and divided by two	Fail	6	3.4167	1.93434	.78969
	Pass	6	3.4167	1.53025	.62472
Total modelling gestures in both cup and mirror play added together and divided by two	Fail	6	4.1667	1.50555	.61464
	Pass	6	3.9167	1.68572	.68819
Total affectionate gestures in both cup and mirror play added together and divided by two	Fail	6	.4167	.66458	.27131
	Pass	6	.5833	.73598	.30046
Total mother gaze in both cup and mirror play added together and divided by two	Fail	6	8.6667	.93095	.38006
	Pass	6	8.0833	.97040	.39616

Group Statistics

	SelfTrolleyTask_PassFail	N	Mean	Std. Deviation	Std. Error Mean
Total infant gaze in both cup and mirror play added together and divided by two	Fail	6	.0000	.00000[a]	.00000
	Pass	6	.0000	.00000[a]	.00000
Total mutual gaze in both cup and mirror play added together and divided by two	Fail	6	.6667	.87560	.35746
	Pass	6	.5833	.49160	.20069
Total directive phrases in both cup and mirror play added together and divided by two	Fail	6	5.4167	1.93434	.78969
	Pass	6	5.3333	3.54495	1.44722
Total affirmative phrases in both cup and mirror play added together and divided by two	Fail	6	.5833	.49160	.20069
	Pass	6	1.0833	1.31972	.53877
Total infant reference in both cup and mirror play added together and divided by two	Fail	6	11.2500	4.63411	1.89187
	Pass	6	9.9167	6.17589	2.52130

a. t cannot be computed because the standard deviations of both groups are 0.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Total face to face in both cup and mirror play added together and divided by two	Equal variances assumed	14.086	.004	-1.736	10	.113
	Equal variances not assumed			-1.736	5.671	.136
Total diagonal in both cup and mirror play added together and divided by two	Equal variances assumed	.336	.575	-.518	10	.616
	Equal variances not assumed			-.518	9.600	.616
Total side to side in both cup and mirror play added together and divided by two	Equal variances assumed	5.594	.040	.946	10	.366
	Equal variances not assumed			.946	5.028	.387
Total behind position in both cup and mirror play added together and divided by two	Equal variances assumed	.018	.897	1.938	10	.081
	Equal variances not assumed			1.938	9.577	.083
Total of supportive, sitting, and close positions in both cup and mirror play added together and divided by two	Equal variances assumed	.291	.601	.206	10	.841
	Equal variances not assumed			.206	9.980	.841
Total directive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	1.040	.332	-1.200	10	.258
	Equal variances not assumed			-1.200	6.955	.269
Total suggestive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	.481	.504	.000	10	1.000
	Equal variances not assumed			.000	9.497	1.000
Total modelling gestures in both cup and mirror play added together and divided by two	Equal variances assumed	.049	.829	.271	10	.792
	Equal variances not assumed			.271	9.875	.792
Total affectionate gestures in both cup and mirror play added together and divided by two	Equal variances assumed	.112	.744	-.412	10	.689
	Equal variances not assumed			-.412	9.898	.689

Independent Samples Test

		t-test for Equality of Means			
				95% Confidence Interval of the Difference	
		Mean Difference	Std. Error Difference	Lower	Upper
Total face to face in both cup and mirror play added together and divided by two	Equal variances assumed	-3.41667	1.96815	-7.80198	.96864
	Equal variances not assumed	-3.41667	1.96815	-8.30121	1.46787
Total diagonal in both cup and mirror play added together and divided by two	Equal variances assumed	-1.58333	3.05619	-8.39294	5.22628
	Equal variances not assumed	-1.58333	3.05619	-8.43161	5.26495
Total side to side in both cup and mirror play added together and divided by two	Equal variances assumed	1.50000	1.58552	-2.03277	5.03277
	Equal variances not assumed	1.50000	1.58552	-2.56898	5.56898
Total behind position in both cup and mirror play added together and divided by two	Equal variances assumed	3.83333	1.97765	-.57315	8.23982
	Equal variances not assumed	3.83333	1.97765	-.59969	8.26636
Total of supportive, sitting, and close positions in both cup and mirror play added together and divided by two	Equal variances assumed	.66667	3.22921	-6.52845	7.86179
	Equal variances not assumed	.66667	3.22921	-6.53036	7.86370
Total directive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	-1.58333	1.31920	-4.52268	1.35602
	Equal variances not assumed	-1.58333	1.31920	-4.70679	1.54013
Total suggestive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	.00000	1.00692	-2.24356	2.24356
	Equal variances not assumed	.00000	1.00692	-2.25977	2.25977
Total modelling gestures in both cup and mirror play added together and divided by two	Equal variances assumed	.25000	.92271	-1.80592	2.30592
	Equal variances not assumed	.25000	.92271	-1.80946	2.30946
Total affectionate gestures in both cup and mirror play added together and divided by two	Equal variances assumed	-.16667	.40483	-1.06869	.73536
	Equal variances not assumed	-.16667	.40483	-1.06995	.73662

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Total mother gaze in both cup and mirror play added together and divided by two	Equal variances assumed	.069	.797	1.063	10	.313
	Equal variances not assumed			1.063	9.983	.313
Total mutual gaze in both cup and mirror play added together and divided by two	Equal variances assumed	3.853	.078	.203	10	.843
	Equal variances not assumed			.203	7.867	.844
Total directive phrases in both cup and mirror play added together and divided by two	Equal variances assumed	2.118	.176	.051	10	.961
	Equal variances not assumed			.051	7.735	.961
Total affirmative phrases in both cup and mirror play added together and divided by two	Equal variances assumed	2.372	.155	-.870	10	.405
	Equal variances not assumed			-.870	6.361	.416
Total infant reference in both cup and mirror play added together and divided by two	Equal variances assumed	.976	.347	.423	10	.681
	Equal variances not assumed			.423	9.275	.682

Independent Samples Test

		t-test for Equality of Means			
				95% Confidence Interval of the Difference	
		Mean Difference	Std. Error Difference	Lower	Upper
Total mother gaze in both cup and mirror play added together and divided by two	Equal variances assumed	.58333	.54899	-.63989	1.80656
	Equal variances not assumed	.58333	.54899	-.64018	1.80684
Total mutual gaze in both cup and mirror play added together and divided by two	Equal variances assumed	.08333	.40995	-.83008	.99675
	Equal variances not assumed	.08333	.40995	-.86479	1.03145
Total directive phrases in both cup and mirror play added together and divided by two	Equal variances assumed	.08333	1.64865	-3.59009	3.75676
	Equal variances not assumed	.08333	1.64865	-3.74126	3.90793
Total affirmative phrases in both cup and mirror play added together and divided by two	Equal variances assumed	-.50000	.57494	-1.78105	.78105
	Equal variances not assumed	-.50000	.57494	-1.88768	.88768
Total infant reference in both cup and mirror play added together and divided by two	Equal variances assumed	1.33333	3.15216	-5.69012	8.35678
	Equal variances not assumed	1.33333	3.15216	-5.76524	8.43190

Group Statistics

	MirrorTask_passfail	N	Mean	Std. Deviation	Std. Error Mean
Total face to face in both cup and mirror play added together and divided by two	Fail	9	3.3889	3.95899	1.31966
	Pass	3	.0000	.00000	.00000
Total diagonal in both cup and mirror play added together and divided by two	Fail	9	8.1667	5.60692	1.86897
	Pass	3	10.6667	3.32916	1.92209
Total side to side in both cup and mirror play added together and divided by two	Fail	9	1.1111	3.15018	1.05006
	Pass	3	.0000	.00000	.00000
Total behind position in both cup and mirror play added together and divided by two	Fail	9	5.0000	3.98434	1.32811
	Pass	3	7.3333	3.32916	1.92209
Total of supportive, sitting, and close positions in both cup and mirror play added together and divided by two	Fail	9	4.3333	4.82183	1.60728
	Pass	3	10.3333	4.85627	2.80377
Total directive gestures in both cup and mirror play added together and divided by two	Fail	9	2.3333	2.56174	.85391
	Pass	3	.8333	1.04083	.60093
Total suggestive gestures in both cup and mirror play added together and divided by two	Fail	9	3.8889	1.61589	.53863
	Pass	3	2.0000	.86603	.50000
Total modelling gestures in both cup and mirror play added together and divided by two	Fail	9	3.7778	1.66040	.55347
	Pass	3	4.8333	.76376	.44096
Total affectionate gestures in both cup and mirror play added together and divided by two	Fail	9	.3889	.65085	.21695
	Pass	3	.8333	.76376	.44096
Total mother gaze in both cup and mirror play added together and divided by two	Fail	9	8.1667	1.00000	.33333
	Pass	3	9.0000	.50000	.28868

Group Statistics

	MirrorTask_passfail	N	Mean	Std. Deviation	Std. Error Mean
Total infant gaze in both cup and mirror play added together and divided by two	Fail	9	.0000	.00000[a]	.00000
	Pass	3	.0000	.00000[a]	.00000
Total mutual gaze in both cup and mirror play added together and divided by two	Fail	9	.6667	.66144	.22048
	Pass	3	.5000	.86603	.50000
Total directive phrases in both cup and mirror play added together and divided by two	Fail	9	5.5556	3.10689	1.03563
	Pass	3	4.8333	1.25831	.72648
Total affirmative phrases in both cup and mirror play added together and divided by two	Fail	9	.8889	1.13957	.37986
	Pass	3	.6667	.28868	.16667
Total infant reference in both cup and mirror play added together and divided by two	Fail	9	10.8333	5.73367	1.91122
	Pass	3	9.8333	4.36845	2.52212

a. t cannot be computed because the standard deviations of both groups are 0.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Total face to face in both cup and mirror play added together and divided by two	Equal variances assumed	6.698	.027	1.436	10	.182
	Equal variances not assumed			2.568	8.000	.033
Total diagonal in both cup and mirror play added together and divided by two	Equal variances assumed	.460	.513	-.717	10	.490
	Equal variances not assumed			-.933	6.187	.386
Total side to side in both cup and mirror play added together and divided by two	Equal variances assumed	1.625	.231	.592	10	.567
	Equal variances not assumed			1.058	8.000	.321
Total behind position in both cup and mirror play added together and divided by two	Equal variances assumed	.460	.513	-.906	10	.386
	Equal variances not assumed			-.999	4.130	.373
Total of supportive, sitting, and close positions in both cup and mirror play added together and divided by two	Equal variances assumed	.041	.843	-1.864	10	.092
	Equal variances not assumed			-1.857	3.438	.149
Total directive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	.638	.443	.962	10	.359
	Equal variances not assumed			1.437	9.029	.185
Total suggestive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	5.075	.048	1.894	10	.088
	Equal variances not assumed			2.570	6.984	.037
Total modelling gestures in both cup and mirror play added together and divided by two	Equal variances assumed	2.543	.142	-1.039	10	.323
	Equal variances not assumed			-1.492	8.186	.173
Total affectionate gestures in both cup and mirror play added together and divided by two	Equal variances assumed	.026	.876	-.988	10	.347
	Equal variances not assumed			-.904	3.041	.432

Independent Samples Test

		t-test for Equality of Means			
				95% Confidence Interval of the Difference	
		Mean Difference	Std. Error Difference	Lower	Upper
Total face to face in both cup and mirror play added together and divided by two	Equal variances assumed	3.38889	2.36069	-1.87105	8.64883
	Equal variances not assumed	3.38889	1.31966	.34574	6.43204
Total diagonal in both cup and mirror play added together and divided by two	Equal variances assumed	-2.50000	3.48754	-10.27073	5.27073
	Equal variances not assumed	-2.50000	2.68095	-9.01226	4.01226
Total side to side in both cup and mirror play added together and divided by two	Equal variances assumed	1.11111	1.87840	-3.07423	5.29645
	Equal variances not assumed	1.11111	1.05006	-1.31033	3.53255
Total behind position in both cup and mirror play added together and divided by two	Equal variances assumed	-2.33333	2.57481	-8.07036	3.40369
	Equal variances not assumed	-2.33333	2.33631	-8.74005	4.07338
Total of supportive, sitting, and close positions in both cup and mirror play added together and divided by two	Equal variances assumed	-6.00000	3.21916	-13.17273	1.17273
	Equal variances not assumed	-6.00000	3.23179	-15.58248	3.58248
Total directive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	1.50000	1.55873	-1.97306	4.97306
	Equal variances not assumed	1.50000	1.04416	-.86093	3.86093
Total suggestive gestures in both cup and mirror play added together and divided by two	Equal variances assumed	1.88889	.99753	-.33374	4.11152
	Equal variances not assumed	1.88889	.73493	.15025	3.62753
Total modelling gestures in both cup and mirror play added together and divided by two	Equal variances assumed	-1.05556	1.01592	-3.31917	1.20806
	Equal variances not assumed	-1.05556	.70765	-2.68097	.56986
Total affectionate gestures in both cup and mirror play added together and divided by two	Equal variances assumed	-.44444	.44997	-1.44703	.55814
	Equal variances not assumed	-.44444	.49144	-1.99659	1.10770

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Total mother gaze in both cup and mirror play added together and divided by two	Equal variances assumed	2.380	.154	-1.356	10	.205
	Equal variances not assumed			-1.890	7.538	.098
Total mutual gaze in both cup and mirror play added together and divided by two	Equal variances assumed	.488	.501	.354	10	.731
	Equal variances not assumed			.305	2.827	.781
Total directive phrases in both cup and mirror play added together and divided by two	Equal variances assumed	4.107	.070	.382	10	.710
	Equal variances not assumed			.571	9.047	.582
Total affirmative phrases in both cup and mirror play added together and divided by two	Equal variances assumed	1.515	.246	.324	10	.752
	Equal variances not assumed			.536	9.908	.604
Total infant reference in both cup and mirror play added together and divided by two	Equal variances assumed	.843	.380	.273	10	.790
	Equal variances not assumed			.316	4.579	.766

Independent Samples Test

		t-test for Equality of Means			
				95% Confidence Interval of the Difference	
		Mean Difference	Std. Error Difference	Lower	Upper
Total mother gaze in both cup and mirror play added together and divided by two	Equal variances assumed	-.83333	.61464	-2.20283	.53616
	Equal variances not assumed	-.83333	.44096	-1.86112	.19446
Total mutual gaze in both cup and mirror play added together and divided by two	Equal variances assumed	.16667	.47140	-.88369	1.21702
	Equal variances not assumed	.16667	.54645	-1.63430	1.96763
Total directive phrases in both cup and mirror play added together and divided by two	Equal variances assumed	.72222	1.89020	-3.48940	4.93384
	Equal variances not assumed	.72222	1.26503	-2.13720	3.58164
Total affirmative phrases in both cup and mirror play added together and divided by two	Equal variances assumed	.22222	.68493	-1.30391	1.74835
	Equal variances not assumed	.22222	.41481	-.70320	1.14764
Total infant reference in both cup and mirror play added together and divided by two	Equal variances assumed	1.00000	3.65858	-7.15182	9.15182
	Equal variances not assumed	1.00000	3.16447	-7.36474	9.36474

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SelfTrolleyTask_PassFail * MirrorTask_passfail	12	100.0%	0	0.0%	12	100.0%

SelfTrolleyTask_PassFail * MirrorTask_passfail Crosstabulation

			MirrorTask_passfail		
			Fail	Pass	Total
SelfTrolleyTask_PassFail	Fail	Count	4	2	6
		Expected Count	4.5	1.5	6.0
		% within SelfTrolleyTask_PassFail	66.7%	33.3%	100.0%
		% within MirrorTask_passfail	44.4%	66.7%	50.0%
		% of Total	33.3%	16.7%	50.0%
	Pass	Count	5	1	6
		Expected Count	4.5	1.5	6.0
		% within SelfTrolleyTask_PassFail	83.3%	16.7%	100.0%
		% within MirrorTask_passfail	55.6%	33.3%	50.0%
		% of Total	41.7%	8.3%	50.0%
Total		Count	9	3	12
		Expected Count	9.0	3.0	12.0
		% within SelfTrolleyTask_PassFail	75.0%	25.0%	100.0%
		% within MirrorTask_passfail	100.0%	100.0%	100.0%
		% of Total	75.0%	25.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.444[a]	1	.505	1.000	.500	
Continuity Correction[b]	.000	1	1.000			
Likelihood Ratio	.451	1	.502	1.000	.500	
Fisher's Exact Test				1.000	.500	
Linear-by-Linear Association	.407[c]	1	.523	1.000	.500	.409
N of Valid Cases	12					

a. 4 cells (100.0%) have expected count less than 5. The minimum expected count is 1.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -.638.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SelfTrolleyTask_PassFail * ObjectTrolleyTask_PassFail	12	100.0%	0	0.0%	12	100.0%

SelfTrolleyTask_PassFail * ObjectTrolleyTask_PassFail Crosstabulation

			ObjectTrolleyTask_PassFail		
			Fail	Pass	Total
SelfTrolleyTask_PassFail	Fail	Count	2	4	6
		Expected Count	1.0	5.0	6.0
		% within SelfTrolleyTask_PassFail	33.3%	66.7%	100.0%
		% within ObjectTrolleyTask_PassFail	100.0%	40.0%	50.0%
		% of Total	16.7%	33.3%	50.0%
	Pass	Count	0	6	6
		Expected Count	1.0	5.0	6.0

SelfTrolleyTask_PassFail * ObjectTrolleyTask_PassFail Crosstabulation

		ObjectTrolleyTask_PassFail		
		Fail	Pass	Total
Total	% within SelfTrolleyTask_PassFail	0.0%	100.0%	100.0%
	% within ObjectTrolleyTask_PassFail	0.0%	60.0%	50.0%
	% of Total	0.0%	50.0%	50.0%
	Count	2	10	12
	Expected Count	2.0	10.0	12.0
	% within SelfTrolleyTask_PassFail	16.7%	83.3%	100.0%
	% within ObjectTrolleyTask_PassFail	100.0%	100.0%	100.0%
	% of Total	16.7%	83.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	2.400[a]	1	.121	.455	.227	
Continuity Correction[b]	.600	1	.439			
Likelihood Ratio	3.175	1	.075	.455	.227	
Fisher's Exact Test				.455	.227	
Linear-by-Linear Association	2.200[c]	1	.138	.455	.227	.227
N of Valid Cases	12					

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.00.

b. Computed only for a 2x2 table

c. The standardized statistic is 1.483.

Group Statistics

	SelfTrolleyTask_PassFail	N	Mean	Std. Deviation	Std. Error Mean
Mean score for the independent SCS questions (total divided by 15)	Fail	6	4.7833	.60800	.24822
	Pass	6	4.7833	.89981	.36735
Mean score for the interdependent SCS questions (total divided by 15)	Fail	6	4.7000	.88318	.36056
	Pass	6	4.7167	.44460	.18151

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Mean score for the independent SCS questions (total divided by 15)	Equal variances assumed	.501	.495	.000	10	1.000
	Equal variances not assumed			.000	8.778	1.000
Mean score for the interdependent SCS questions (total divided by 15)	Equal variances assumed	2.024	.185	-.041	10	.968
	Equal variances not assumed			-.041	7.381	.968

Independent Samples Test

		t-test for Equality of Means			
				95% Confidence Interval of the Difference	
		Mean Difference	Std. Error Difference	Lower	Upper
Mean score for the independent SCS questions (total divided by 15)	Equal variances assumed	.00000	.44335	-.98784	.98784
	Equal variances not assumed	.00000	.44335	-1.00680	1.00680
Mean score for the interdependent SCS questions (total divided by 15)	Equal variances assumed	-.01667	.40366	-.91609	.88275
	Equal variances not assumed	-.01667	.40366	-.96128	.92794

Group Statistics

	MirrorTask_passfail	N	Mean	Std. Deviation	Std. Error Mean
Mean score for the independent SCS questions (total divided by 15)	Fail	9	4.7556	.85310	.28437
	Pass	3	4.8667	.15275	.08819
Mean score for the interdependent SCS questions (total divided by 15)	Fail	9	4.8222	.39616	.13205
	Pass	3	4.3667	1.25831	.72648

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Mean score for the independent SCS questions (total divided by 15)	Equal variances assumed	3.201	.104	-.218	10	.832
	Equal variances not assumed			-.373	9.270	.717
Mean score for the interdependent SCS questions (total divided by 15)	Equal variances assumed	6.569	.028	1.028	10	.328
	Equal variances not assumed			.617	2.134	.597

Independent Samples Test

		t-test for Equality of Means			
				95% Confidence Interval of the Difference	
		Mean Difference	Std. Error Difference	Lower	Upper
Mean score for the independent SCS questions (total divided by 15)	Equal variances assumed	-.11111	.51072	-1.24908	1.02685
	Equal variances not assumed	-.11111	.29773	-.78164	.55942
Mean score for the interdependent SCS questions (total divided by 15)	Equal variances assumed	.45556	.44333	-.53225	1.44336
	Equal variances not assumed	.45556	.73839	-2.53804	3.44915